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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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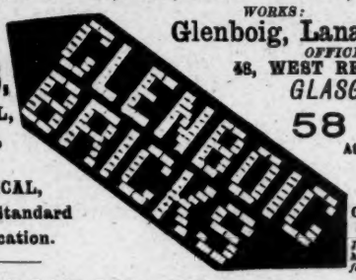

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLVII., No. 2932.] TUESDAY, JULY 22, 1919. [71ST YEAR.

EDITORIAL NOTES.

The Six Shilling Increase from Yesterday—A Proposal and a Rejection.

CHANGES are said to be good for body and soul; but the Government and labour, singly or jointly, subject us to such rapid changes that it is almost impossible to define one position before we are precipitated into another. And then we have to consider afresh our location. We do not believe that in such circumstances the apothegm holds good. Be that as it may, last week we were discussing the acute blow to the progress, prosperity, and comfort of the whole country that the increase of 6s. in the price of coal represented, and which, according to the Government programme, was to come into force last Wednesday. While yesterday week our comments were being printed upon the position as it then stood, a momentous discussion was proceeding in the House of Commons, which resulted in a fresh surprise—a proposed postponement of the imposition of the 6s. in order to see whether, by the united efforts of the Government and the miners, there could be such an uplifting of production that an increase of 6s. would be unnecessary. This is interesting; and the experiment would have been worth trying. But the country would have had to take the consequences of failure. Sir Auckland Geddes proved up to the hilt on Monday last week that, as things are at the present time, through increased costs and reduced output, the 6s. is an imperative necessity to make accounts balance so that the Government can meet its mining obligations. As things are, a loss of 5s. 10½d. per ton has already commenced; so that if there had not been at once realized a partial set-off progressively increasing in volume and value, then the country would have already begun to accumulate a debt which would either have had to be liquidated by the taxpayer or by a greater increase in the price of coal after the three months' experiment, which it is not at all likely now will be carried out.

Looking at the facts and figures that Sir Auckland laid before the House, it is evident that the production efforts of the miners could not alone yield a sufficiency to rule-out the necessity for some part, and probably a considerable part, of the 6s. still being paid by the coal consumers. All expenses, other than (under their controlled limit) colliery owners' profits, have risen; but labour costs, including the Sankey award, stand pre-eminent among the items with 21s. 10½d. per ton as from July 16, compared with 6s. 4d. in 1913. This is an enormous difference; and the miners' working day as shortened by an hour is already an actuality. There are in these two conditions obstacles to full compensation for the 6s. being obtained by any joint effort of the Government and the miners. And there are other conditions opposing. The speech of the President of the Board of Trade was a politic and transparently fair one; and in justice the whole of the blame cannot (but a substantial part can) be laid at the doors of the miners. We have to learn of effects by experience; and we are learning more and more of how mutation in one industry reacts favourably or otherwise on other industries. In this case the eight-hour day on the railways is adversely affecting transit; and this seriously diminishes the supply of wagons within a given time at the collieries. The shortening of the hours of work in other industries causes some delay in the clearing and loading of wagons at factories; and this again affects the supply to the pits. There is also a large arrear of wagon-repairing work to be made up; and a more plentiful supply of tubs is required. Shorter hours will not remedy these latter conditions so rapidly as would longer working days. We are only just learning by the effects of modern changes the great depth of the alliance (though many people are not conscious of it) that exists between industries, and how disturbance of an existing state in one may react seriously upon others. It is certain we shall never get rid of all the ill-effects of some modern changes; but we must try to mitigate them by an adjustment as far as possible of new circumstances as between industry and industry. Thus it is the miners have not to be credited with all the shortage that there has been in the output of coal. Some of their representatives have been very anxious to have an investigation as to the causes of the lower output. The speech of the President of the Board of Trade makes these causes fairly obvious; and rather than waste time in trying to apportion blame with more or less mathematical accuracy, it would be better for the Government and the miners (if they will) to set to work to solve the problem of greater production by practical means. Where there's the will, there's a way. And while the miners are expected to supply the will and the thew, the Government pledged themselves to furnish as quickly as possible the essential material, machinery, and wagons. Though, when first the proposal was heard of, we hoped well for the experiment, we doubted the capacity of the three months for supplying much in the way of material, machinery, and wagons that could have substantial effect within that period. As to the miners, the leaders in the House could give assurances respecting what they could do, but they could not offer guarantees. Yet the country is in the midst of an acute crisis, which, if there is not an immediate retreat from the attitude taken up by extremists in the labour world, will rebound upon the workers in a manner which will be anything but agreeable. Nothing can avert this but the restoration of moderation to the place that has been, and is still, occupied by extravagance.

We fully believe that those members of the Labour Party who spoke in the House yesterday week were sincere in their recognition of the necessity for increasing production of not only coal, but all other manufactures upon which the country depends for progress and prosperity. Certain it is that, if there is not that greater production, and if there is recession through the trend that things have been taking, labour will fall with the rest of the country; and it will be the miners who will have taken a big share in producing poverty where prosperity should reign. Recognizing this it evidenced anything but a fine sagacity for a miners' representative in the House to submit that the latter want something more than they have already obtained to stimulate them to well-doing. They have the shortest working day of any of the country's men; and their wages are high. The further stimulus is nationalization, about the probable results of which they know nothing, and, we undertake to say, a majority of the men care less. To put forward nationalization as a necessary stimulus is only to belittle the men's own will, energy, and patriotic desire to see no set-back to the country by their own misdoing; and it is certainly either an insult to their moral rectitude, or correct testimony to their debasement. It was the weakest suggestion that the miners' representatives could have made in the face of their acknowledgment as to the jeopardy in which the country stands. But it was made; and it was feeble. And what would be the good of an inquiry as to the causes of shortage of production if this truly represents the spirit and feeling of the men?

The scene changes from Westminster to Keswick, where the Government proposal was subsequently discussed by the Miners' Conference, over which the irreconcilable Mr. Smillie presided. There were strongly divided counsels. The labour members of Parliament made a very earnest and eloquent appeal to the delegates to recognize the obligations

upon them in the hour of the country's need, and to refrain from doing anything that would be a crime against humanity, and that would help to destroy the country's position as a leading industrial and commercial power. But the appeal to the higher senses fell flat before the lower plane attitude of the President, whose speech, if not containing these particular words, indicated that the miners had the country in their power, and it was for them to dictate terms, and, if thought fit, to hold-up the country until there was acquiescence. There was no other meaning to be put upon his advice not to pledge themselves to adopt the Government's suggestion—especially in regard to abandoning their right to strike for three months—without the Government on their part first pledged themselves to the nationalization of the mines. In such a matter the Government must proceed by a legitimate course. As we have said before, nationalization is a question for the nation, and not for the miners; and in matters of policy no section of the community is endowed with the special privilege of enforcing, or causing the rejection of, any line of policy. The delegates were loyal to their President; if right-minded men they were not loyal to their consciences. A resolution was passed in which it was stated that the problem was regarded as one of production only, and that production could only be increased to a point which would make the industry self-supporting without additional charge to the consumer if the economies set forth in the first Sankey report are effected, and the recommendations of the majority of the Commissioners, in the second report, as to the immediate change of ownership and control, be passed into law. That is the price the miners wish to exact for their co-operation with the Government. On no other terms are they prepared, according to the resolution, to help the country out of the disastrous position into which they (supplemented by external causes) have done much to place it. The situation is one of which the miners' delegates ought to be utterly ashamed. There cannot be a strike to force the hands of the Government without a ballot of the men. Already the men must know that public opinion is solidly against them, and that the issue is now one between them and the whole of the rest of the nation. Knowing this, they will, we fear, still listen to the voice that advises the overthrow of constitutional government.

The result of the Keswick conference was made known on Friday, and the Government announced that the necessary Board of Trade Order would be issued, making the increase of 6s. operative as from yesterday. In response to an appeal by Mr. Clynes in the House on Friday, that the door should not be closed to further negotiations, Mr. Bonar Law willingly assented. There is no question that other sections of organized labour, responsible in the aggregate to a greater section of the community than the miners, feel that the latter have successfully carried their demands quite far enough; and that the whole of the working people of the country are now to pay the penalty of what has been done. It was expected that a further important announcement would be made yesterday.

Gas-Works and Fuel Economy.

GAS-WORKS can take a large part, in their own operations, in promoting fuel economy. The responsible technicians of the gas industry have shown their capacity in this direction by extracting more thermal value in gaseous form from coal during the war than was done before; and there was additional suggestion for them at the annual meeting of the Society of Chemical Industry in the City last week, under the presidency of Prof. Henry Louis, who is a good representative of those front-line chemists who believe that the carbonization of bituminous coal, and not its direct use, is the correct road to much economy and profit to the country. The gas industry has come to be more and more recognized as a basic industry to chemical manufacture, and so there is a well-defined alliance between them, which has brought our industry to be counted as an inherent part of the chemical industry. Dr. Charles Carpenter, the predecessor of Prof. Louis in the chair of the Society of Chemical Industry, has with good effect worked to strengthen the personal link between the two industries; and he has in this been uncommonly successful. The relationship of the industries was seen in remarkable degree at the meeting last week—through the references to the warwork of the chemist on the secondary products secured by the gas and coking industries, as well as to the part which the gas industry can and does take in fuel economy. It is certain that the gas industry has the chemical industry strongly on its side; and the companionship is one which must be developed, because it will be mutually advantageous. The chemical industry has learnt more of the gas industry through intercommunication during the last few war-strained years than it had done during all its preceding years.

But regarding fuel economy. Particular attention should be given to the paper by Captain C. J. Goodwin on waste-heat boilers, for in it he showed how the waste heat—the "waste heat" be it noted—of retort-settings can be profitably utilized for steam-raising. The subject is not new; but the paper will bring British gas men into closer contact with it. Gas retort-settings are not alike; and the amount of heat escaping from one setting cannot be taken as any measure of the amount escaping from another. We know that, when an amount of work is being done in a retort-setting while the fuel consumption is so much, we are working, relatively to the best standards, economically or otherwise. All the same, no matter the type of furnace and setting, there is an amount of waste heat passing away, some of which can be prevented by a certain expenditure on insulation, while other part can be brought to account in doing work. A great deal of the improvement that is being made in thermal efficiency to-day may be called auxiliary to the main efficiency. This is a case in point. Captain Goodwin tells of how, in a gas-works with settings totalling sixty retorts, through the waste heat, 7500 lbs. of steam per hour can be raised in return for a capital outlay of about £4000, with relatively small operating expense. Captain Goodwin does not speak without experience; but what can be done will, and must, vary with the type of setting, because waste heat as between different settings is not a constant quantity. Then further saving is possible by using for boiler feed the preheated water from gas-engine cylinder jackets. But these are matters to which gas engineers, we are afraid, have not hitherto given much attention, because boiler fuel with them has been cheap. Times have altered. Fuel costs more money; and the cheap fuel on gas-works is to-day a marketable commodity, and therefore a revenue producer for gas-works. Mr. P. Parrish, in a communication at the meeting, showed what can be done with coke breeze in raising steam by the use of forced draught. Coke breeze cannot be used just anyhow; but, properly applied and properly treated, as good results can be obtained from it as from high-class coal without forced draught. There is also the gas-firing of boilers. Prof. William A. Bone and Mr. P. St. G. Kirke showed in a paper what is being done in this direction with surface-combustion methods. Several improvements suggested by working experience have been made; and these—particularly the rigid form of packing now used in the tubes—have given greater elasticity to the heating of boilers by this highly efficient method. The meeting was rich in illustration of how work is proceeding in all quarters of the industrial world to gain efficiency.

Gas Research Work and the Consumers.

AT the present time, the gas industry has as many subjects on hand connected with immediate difficulties and future operation as it can possibly attend to; and these cannot be deferred. Were it not for these pressing matters, there are others also of immense importance which claim consideration and action. One of them is raised in a letter in our "Correspondence" columns by Mr. Douglas Rider; and it is the question of establishing a central laboratory equipped with talent and apparatus worthy an industry of such vast importance to the country as that of carbonizing coal for the production of gas and other products. The industry offers an unrivalled scope for research. The limits of its potentialities are unknown; but there is ample information in possession to show that developments are possible which will have a creative and revolutionizing effect, not only for the industry itself, but for the country at large. Though the time is not immediately opportune for taking in hand a large scheme for a central laboratory for the gas industry, all time is good for consideration and for preparation; and particularly now, when we are altering our ways from past more or less stereotyped methods to those which acknowledge that the gas industry's operations are capable of progressive development by the aid of scientific exploration. The men of the gas industry would be unworthy of their trust if they rested upon any conviction that the best of what is done by them to-day represents the highest attain-

able altitude. It does not; and it is only by the directions of scientific investigation that they can now proceed from one success to another.

Therefore, a central laboratory on a fitting scale is something that the industry should have, and must have, in due season. It is a subject that is not new. It has been raised time and again in presidential addresses and papers; but the attitude of the industry is well mirrored in the fact that nothing has been collectively done towards a realization of individually expressed ambition and advice. But the times are altering. Things are seen in new light to-day. External developments have had a forceful way with them in bringing home the truth. We are surrounded, too, by internal conditions which it is now agreed could have been the better dealt with if they had long since been subjected to well-directed scientific investigation. We see the initial stages to the materializing of the aspiration for the establishing of a central research laboratory in the powers possessed by the National Gas Council, the Institution of Gas Engineers, and the organizations dealing with benzol and sulphate of ammonia. A central laboratory could compass all investigation for the industry, including its secondary products. The collaboration of every organization would be fruitful; and the National Gas Council is now in a position to reach all gas undertakings for the necessary funds, which could be supplemented by the organizations interested in special lines of work, in which the coke-oven industry would also be concerned. We therefore look more hopefully than ever upon the consummation of this long-deferred hope of many thoughtful gas men; and if Mr. Rider's letter succeeds in reviving the question, and getting it placed upon the programme for the earliest convenient consideration, with the view to appointing a suitably constituted Committee to devise a scheme for discussion and promotion, it will have done a good work.

But there is another side to Mr. Rider's communication with which we are not altogether in agreement. It will be seen that the articles that appeared in the "JOURNAL" for July 8 on the research work that is proceeding at the chemical and physical laboratories of the South Metropolitan Gas Company, induced our correspondent to pen his letter. Now, in the first place he indicates that a central laboratory would prevent a lot of duplicating of work which proceeds through the running of laboratories at individual works. With this we agree. But it is not all duplicated work running on the same lines and under the same conditions. Differences of conditions have their influence on investigation; and we are thorough believers in brain diversity being brought to bear upon it. The greater the application of competent brain power the better, and the greater the range of result and suggestion. Therefore we should be very sorry to see a central laboratory put forward as a reason for the suppression of any individual works' enterprise in this direction. Further, our correspondent appears to be much concerned as to the cost to the gas consumers of investigation by individual works. Admittedly such work is not done for nothing; but it must be remembered—the South Metropolitan Company's laboratories may be taken as an example—that the work is not all research, but partly control, in the interests of the consumers. They benefit by getting constant quality, which there is no denying is an important factor in constant result. Being outside we cannot, of course, discriminate as between the costs of control and research; nor have we any information as to the expense of the research carried on at the South Metropolitan Company's laboratories. But it is interesting to take a figure to ascertain how far the consumers are, by the research, subjected to the heinous process of "penalizing" to which Mr. Rider refers. Let us take the hypothetical figure of £10,000 as representing the part of the cost for which research is annually responsible. Last year the Company sold 12,790,695,000 c.ft. of gas; and upon this sale the £10,000 works out to 0·18d. per 1000 c.ft. So that research, whatever (within reason) the annual cost figure may be, cannot inflict any great pecuniary hardship on the consumers. We have no doubt, too, Dr. Carpenter would say that the consumers have profited by what the Company have done in this connection. However, a central research laboratory for an industry is the right thing. We can see no cause for the suppression of works' research, but very good reasons for its continuance, where it can be carried on as at the South Metropolitan Company's works without, over such a large business as theirs, any really appreciable cost per 1000 c.ft. of gas sold.

Reunion of French Gas Colleagues.

THE circumstances of the meeting of the Société Technique du Gaz at Metz this year were of a character which must have given exceptional pleasure to members. The chain of their annual conferences contains now several broken links through the cruel interruption of peace by devastating war. But reunion makes some amends; and the restoration of Alsace-Lorraine to France as one of the issues of the war is something which makes the heart of every Frenchman rejoice. For the gas engineers of our chief allies in this war to be meeting, under the presidency of M. Francis Rouland, at Metz, once again under French Government, was alone sufficient to stamp the occasion as notable, and to inspire them to go forward with the work of their own industry with renewed enthusiasm and energy. Their British colleagues only know by report all that they have suffered—particularly those within the war zones, or within range of bombardment by gun or aeroplane; and farther afield by the greater difficulties than we have experienced by the collapse or intermittency of supplies, and the heavy prices paid for them when obtainable. Some account of their trials and tribulations appears in the speech of Mr. H. E. Jones at the meeting of the European Gas Company, as reported this week; and other indications will be found in the "General Review" of the proceedings at the meeting of the Société, about parts of the technical features of which more detail will appear later. Together, French and British, with their other Allies, have stood on the field of battle. The war has been won; and now we have to press forward with the ordinary work of the day, which is impeded by the chaos left by the war. But the difficulties will be attacked with good heart; and in time we shall once again be normally at work, but under new conditions. Of these things, mixed with congratulation, British gas engineers will be talking in the autumn face to face, and in cordial fellowship, with their French *confrères* if good fortune permits the maturing of the plans the Société have in hand for a reunion in Paris.

More Advice for the Gas Industry.

A GLOOMY correspondent of "The Times" has been writing upon the problems of coal and the right use of gas, and saying that a broad policy is needed. These are things that the gas industry has been urging for some time; but the methods of the industry are not in line with those of the gloomy one, who thinks there is little doubt that the industry is doomed to extinction as a separate entity, but in any case its methods must be entirely remodelled. Apparently there is no need for the industry to work out its own lines of procedure in strengthening its position, and developing its activities. This writer has it all cut-and-dried as to the way the industry should go. But his plans are not likely to be accepted. We should imagine that he is a very close student of the dicta in this regard of Prof. H. E. Armstrong, or perhaps the pen is that of the Professor himself. We do not know; but there is a remarkable similarity between the counsels of that gentleman and those in the article before us. There is an admission that electricity stands little chance in heating, and gas in lighting; and therefore, it is urged, there should be a consolidation of the coal, gas, and electricity industries, as otherwise the public interests will not be served. The critic has a smaller opinion as to the intellectual capacity within the gas industry than he has of his own; for in his considered judgment, "the outlook of the gas interests sug-" gests little probability that the needed reforms will come " from within." There is faint recognition that the efficiency of gas appliances has been improved of late; but we come into contact with the lines of the argument proper when the writer says that what is most needed is the improvement of heating appliances in which solid fuel is burned—especially those used in cooking—if we are to continue to work with solid fuel and use it economically. The step from this suggestion to low-temperature carbonization is a short one; for by its aid we get smokeless fuels. All this is in accordance with Prof. Armstrong's advocacy. Part of the coke could be used in producers, the ammonia recovered, and the gas used for the production of electricity, or else transmitted to a distance—for industrial use. The high-grade gas could be employed for domestic heating purposes, which is just the gas that is not, for distribution for heating purposes, the most profitable either for the country, the gas industry, or the gas consumers. The critic and counsellor apparently does not know much about modern developments in the

industry. If he does, he has successfully concealed the fact. There is one redeeming feature. The writer is not satisfied that carbonization or electricity generation at the pithead would produce any advantage; coal in his view being a particularly compact form of transmitting energy and other things about the country. But what worries the counsellor more than anything else is that, though he knows the way to our economic salvation in regard to coal, the narrowness of the outlook which prevails among those who have taken it upon themselves to deal with the problems that coal presents leaves small chance of any proper system being developed. We are very sorry this should be his view; but we can assure him the gas industry has no intention of committing suicide. It has also yet to learn that, in respect of this particular matter, the critic and counsellor has the monopoly of intelligence.

The Prepayment Meter Excess Charge.

Certain London Liberal members of Parliament are proposing to interfere in the business relations, which are statutorily controlled, between the London gas companies and their prepayment meter consumers; but we rather think they are doing this under a misapprehension. The prepayment customers of the three London Gas Companies at Dec. 31 last numbered 893,008, which is more than double the total of ordinary consumers. Shortly after Sir Auckland Geddes had made his speech last week upon the coal situation, a meeting was held of the London Liberal members of Parliament to consider, among other things, the effect of this situation upon the prepayment gas-meter users. They have discovered that the Metropolis Gas (Prepayment Meter) Act, 1900, permits an extra charge of 10d. to be made per 1000 c.ft. for such service, including the installation and provision of appliances; and they have decided to ask the President of the Board of Trade not to allow any advance beyond this limit before receiving a deputation on the matter. The members of Parliament surely cannot know that this extra 10d. represents the capital and maintenance charges on the installation and appliances, together with the extra expenditure that the system entails through collection, &c., in excess of the cost that is occasioned by the ordinary consumers. To-day the position is much worse than when the 1900 Act was passed. Meters, materials, and labour all cost more; so that capital, maintenance, and working expenses of the system are considerably higher. Why the gas companies should always be supposed to bear the expense of changes which other businesses cannot stand, and to render service below cost, is beyond our comprehension; but evidently the London Liberal members think they ought to do so. We should like to know the reasons upon which such a conclusion is based.

District Electricity Boards Discarded.

The opposition to the Electricity Supply Bill has been too strong for the Government; and they have (rather than court disaster) made a radical alteration in it. The Home Secretary announced this at the meeting of Standing Committee B last Tuesday; and, after explanations were given, the Committee adjourned for another week. This alteration will leave things much as they are, with this exception, that the Electricity Commissioners will be paramount in the electricity industry, and will set systematically to work to produce greater control and co-ordination. They will hold local inquiries; and, where it is considered necessary, the electricity undertakings will be grouped, and will constitute an area. If, in the opinion of the Commissioners, the electricity organization in a district should be improved, they will hold an inquiry, and give to the authorized undertakers, local authorities, and large consumers within the district an opportunity to submit a scheme for effecting improvement. If no such scheme is forthcoming, then the Commissioners will have power to propose one for the formation of a District Board. Joint electricity authorities constituted of authorized undertakers may be established; and these may purchase the whole or any part of the undertakings in the area. Any Order made by the Electricity Commissioners will have to be confirmed by the Board of Trade (or, we take it, by the Ministry of Ways and Communications if the transfer to the new department continues to stand in the Bill), and then be approved by both Houses of Parliament. It is thought that the new clause will give greater elasticity, conduce to more efficient working, and be an improvement in every way. Anyway, it (with the consequent changes in the measure) is likely to meet with greater support than the clause it supersedes.

The Broken-Down Sliding-Scale.

In the Money Article of "The Times" the other day, there was a reference to the projected 6s. rise in the price of coal, and to the impossibility of even pretending to continue to enforce on gas companies the pre-war sliding-scale arrangement. This is a quarter from which the position of the gas industry has always received sympathetic treatment; and the palliative which an ungenerous Parliament allowed the industry at a time when the Government is paying 5 p.ct. for money, when the cost of living has more than doubled, and when income-tax is what it is, has always been condemned as a travesty of justice. "What must be quite evident now," he says, "is that the whole sliding-scale provision has completely broken down, when the price of coal to the companies is arbitrarily increased (and therewith the raising of the price of gas enforced upon them) without their having any say in the matter. The whole basis of the Gas Companies' Acts is undermined by the action of the Government with regard to the price of coal."

German Coal and Coke Control.

As was mentioned last week, the German Coal Commission who have been considering the future operation of the coal industry of the country reported against nationalization, and in favour —like Sir Arthur Duckham at home—of united operation and control. The result of the report is a Coal Bill, the final draft of which has now been issued. It covers all solid fuel—coal, gas coke, metallurgical coke, lignites, and briquettes. Amalgamation and control, it appears to us, necessitate, according to the German idea, a cumbrous quantity of machinery. The Empire will exercise supreme control over fuel. There will be an Imperial Coal Council, Expert Committees, an Imperial Coal Association, and Syndicates. The Empire may demand information with regard to the conditions of the industry, take part in discussions of the various bodies constituting the controlling machinery, and may revise the selling prices that have been fixed. The Imperial Coal Council, with its three Expert Committees, is to manage the fuel industry as a public utility, under the supervision of the Empire. It will sanction the contracts of the Imperial Coal Association, and of the Syndicates. General guiding principles will be laid down by it, especially with the view to the elimination of non-economic competition and to the protection of the consumers. Information may be demanded by it from all sources—including gas-works. The Imperial Coal Association will be constituted of fifty members, drawn from all the interests concerned (including consumers). Its purpose will be to supervise the carrying out of the resolutions of the Imperial Coal Council and control output, consumption at the mines, and the sale of fuel. Its powers are far-reaching. The Syndicates are to be formed of the colliery owners in all the eleven mining districts; and the Imperial Coke Syndicate will represent the producers and sellers of coke, and form the twelfth district. No one can escape; all must join the Syndicates, who in turn must join the Association. The Syndicates are to supervise the carrying out of the orders of the Imperial Coal Council and the Imperial Coal Association, and to regulate the output and consumption of coal and coke for the members' own purposes, and the sale of fuel. There is a lot of machinery here. Whether the component parts of the train will work with beautiful smoothness is a matter upon which some doubt is excusable, pending the revelations of experience. But the main thing is that control and not nationalization is preferred by Germany.

OBITUARY.

We regret to record the death, in his 67th year, of Mr. JOHN GEORGE GLOVER, who passed away at St. Malo, Herne Bay, on the 13th inst. Mr. J. G. Glover, in conjunction with Mr. Richard Thomas Glover, carried on the business of Thomas Glover & Co. (the original makers of the dry gas-meter) until 1896, when the new Company, Thomas Glover & Co., Ltd., was formed. Mr. J. G. Glover was Managing-Director of the Company until 1906, when he retired from active participation in the business. The funeral was on Wednesday, at Highgate New Cemetery.

Sir William Crookes, O.M., who died last April, left estate of the value of £29,013.

PEACE CELEBRATIONS AND ILLUMINATIONS.

THE country has had its Peace Day; and the people throughout the British Isles have given vent to their joy over the consummation of victory in the way that best seemed to them good. In London streets, beflagged and otherwise decorated with fitting lavishness, the tramp of representatives of the victorious allied troops have been heard; and dense multitudes have lustily cheered their warriors. The leaders of the Armies and the Navy—men whose names will have imperishable place in history for all time—have been vociferously acclaimed. Music, sports, dancing, bonfires, fireworks, and other forms of rejoicing have been indulged in. High spirits and pure joy have been everywhere, and not even occasional showers during Saturday, with heavier rain in the evening, had any particularly damping effect on the people's pleasure. The night illuminations of buildings did not come up to what they would have been had circumstances been different. Had things been normal, the illuminations would have been on a scale that would have outshone any previous attempts in this line. The causes operating against the putting forth of best efforts were several—coal, material, and labour primarily. The Coal Controller had to issue a fiat in the matter, and to limit the amount of gas and electricity that could be used for this purpose in excess of regulated consumption. There were numerous owners of premises who on other occasions have had splendid shows of night illuminations who considered that they could evidence their patriotism better by not illuminating than by illuminating, in order to do their part in saving in a quarter where the country is being hit at the present time so severely—coal. We want all the coal that can be got now; we shall want very much more intensely all the coal that will be obtainable a little later. Then there were the extortionate demands for pay of the Electrical Trades Union for work on peace illuminations; and neither the Government nor the Employers' Federation would give way to the opportunist demands. Thus it was that public buildings were not illuminated, and that many projected electrical schemes were not completed. There were a few good ones which only gave a taste of what might have been had not an unfortunate accumulation of circumstances put up an insurmountable barrier. Gas took a part with electricity in the illumination schemes that were carried out in the West-end. In the Gas Light and Coke Company's area, prominent examples of gas illumination were: In Pall Mall, a good show of flambeaux—87 in all. The Marlborough Club, in Pall Mall, had a fine illuminated crystal crown. In St. James' Street, there was a good display of open devices. In Piccadilly, Messrs. Lincoln and Bennett, Ltd., displayed two handsome crystals; and Messrs. Fortnum and Mason, two pretty crystal shields and "G.R's." At the Royal Albert Hall, the porch was outlined with "God Save the King," with crown and letters "G.R." over the top. The offices of the Gas Light and Coke Company in the High Street, Kensington, were outlined with "G.R." and "M.R." The devices were a crown, sun in splendour, star and medallion, and words "Thank God for Peace." But these were only examples.

The electrical illuminations, in consequence of the trouble with the Union, were not extensive; but despite the difficulty, there were a few striking displays. Piccadilly Hotel had its long façade decorated by a narrow border of red, white, and blue electric globes, with the Royal crown and cipher in white. Between the columns above were festoons of white and green lights. Illuminated window frames effectively decorated White's, the Regent Hotel, and the Waldorf. The whole front of the Waldorf was decorated with multi-coloured globes with the Royal arms intermingled. The roof of the Regent had upon it one remarkably powerful white light, with three others at a lower level. Selfridge's was also a great attraction.

PERSONAL.

Mr. CHARLES C. SEYMOUR, Assistant Engineer to the Weston-super-Mare Gaslight Company, has been appointed Engineer and Manager to the Broadstairs Gas Company.

Mr. ARTHUR FORSHAW, M.Sc., for more than ten years Chief Chemist to Messrs. John Wright & Co., of Birmingham, has resigned, and will shortly take up a similar post with Messrs. Fletcher, Russell, & Co.

Mr. J. W. MORRISON, the former Chief Engineer of the Sheffield Gas Company, who is now living at Totnes, has been married to Miss Esther Haynes, of Broomhill.

The successor to Mr. P. D. Walmsley as Gas Engineer to the Wombwell Urban District Council is Mr. E. J. WELLENS, who was at one time Engineer to the Hebden Bridge and Mytholmroyd Gas Board, and afterwards Superintendent of the Grimesthorpe station of the Sheffield Gas Company.

It has been decided by the Glasgow Town Council to fix the retiring allowance of Mr. ALEXANDER WILSON, the Gas Engineer, at £500 a year; no arrangement being made as to retaining his services in a consultative capacity.

The Directors of the Altrincham Gas Company have appointed Mr. H. R. S. WILLIAMS (now Works Engineer and Manager) as Engineer and Manager, and Mr. J. ROBINSON (the Office Superintendent) as Office Manager and Accountant. These appointments are consequent upon the death of Mr. J. E. Lamb.

ELECTRICITY SUPPLY MEMORANDA.

THE projected large increase in the price of coal—if it eventually materializes—will sadly upset the calculations of electrical engineers, the same as it will those of the responsible officials of other industries. An increase of 6s. per ton is not a light thing for an electric generating station to bear; and there will be a great deal of heartburning over the fact that the 6s. advance will apply to slack and the inferior coals the same as to high-grade coals. There is no distinction. There has been a large amount of complaint from the electricity industry as to the ash-laden content of coal during the war, and the resulting lower evaporative duty of boilers, together with the increased labour entailed by furnace cleaning and removing and disposing of the ashes. At the same time, there has been a growing tendency on the part of electricity undertakings to buy during the war slack and inferior fuels, and to avoid the higher-grade and more expensive coal. The extended adoption of mechanical feeding has increased the range of fuel useable by generating stations. But against the cheaper fuels, something must be set through the lower evaporative duty of the boilers; and it will very much depend upon the distance of the generating stations from the coalfields, as well as their position in relation to boiler capacity, whether they continue to use lower-grade fuels. It is a matter needing very careful attention. It is not easy to show the comparative effect upon gas and electricity of a 6s. per ton advance, seeing that the producing and selling circumstances of gas-works and generating stations vary so considerably. The gas producing value of coal varies; and the methods of gas-works, combined with coal quality, may mean a production difference per ton of anything between 10,000 and 20,000 c.ft. of gas, ranging from (say) 550 to 450 B.Th.U. Then there are the secondary products which assist to disturb comparison, as coke will have to follow the upward move of coal. But calculating on gas alone, the 6s. may mean anything from 7d. to 3¼d. per 1000 c.ft. On electricity the 6s. may mean anything between an addition of 0·5d. to 0·09d. on fuel cost per unit, or taking the average generation of 500 units per ton, 0·14d. These are units with a heating value of 3420 B.Th.U. Generating stations using 16 lbs. of coal per unit only produce 140 such units per ton; and at the other end of the scale the exceptionally fine station, with an ideal load, may only use 2·8 lbs. of coal, and produce 800 units per ton. The gas-works producing only 10,000 c.ft. of 550 B.Th.U. gas puts on to the market in gaseous form B.Th.U. equivalent to 1611 electrical units per ton of coal; while gas-works making 20,000 c.ft. of 450 B.Th.U. gas, put on to the market B.Th.U. that are the equivalent of 2631 electrical units.

The Six-Shilling Increase.

Oil Fuel and the Coal Controller's Restrictions.

The Coal Controller occupies a most unenviable position. Sir Evan Jones is probably finding out what his predecessor (Sir Guy Calthrop) found. The writer well remembers the latter saying that he was quite willing for anybody else to have the "job" who could do the work better than he was doing it himself. Sir Evan Jones is confronted by a coal position as awkward to-day as at any time during the war; and, though he is nominally Coal Controller, he is very conscious of the fact that there are others at the collieries who are his superiors. The results of their actions control what he can do. There is complaint all over the country regarding the need for having to continue the rulings of the Household Fuel and Lighting Order, though with some modifications. The members of the Diesel Engine Users' Association are protesting against the limitations of the Order. They suggest that those electricity supply undertakings that use oil as fuel should be exempt from an Order whose purpose is to effect a saving of coal. They hold that there is no need, where electric energy is derived from plants in which fuel other than coal is employed, for consumers to be inconvenienced by restrictions—in fact, there is every reason for encouragement to be given to the development of the use of power in such areas. We hardly think the Coal Controller can seriously contemplate making regulations giving preferential treatment in this way. If he did so, he would find himself mixed up in all sorts of complications—particularly in those cases where there is more than one kind of fuel used. Some undertakings use coal and oil; there are others that employ gas and oil. Some use coal and the bye-product of gas manufacture—coke. Discrimination and allocation of the proportion of the energy generated from the one fuel or the other would be a difficult matter. Gas-works making water gas for admixture, in the proportion of 20 to (perhaps) 40 p.ct., with coal gas might also ask of the Coal Controller some indulgence for their consumers beyond the gas equivalent per ton of coal. Coke according to quality and working, will make 45,000 to 60,000 c.ft. of water gas per ton; so that a relatively small amount of this bye-product of coal-gas manufacture is required to considerably augment gas production per ton of coal. But the Coal Controller's reply to requests for special consideration is that he wants all possible coal savings effected by the use of alternative fuels; and he must keep free from any more complications than those with which he is now struggling. After all, the "restriction" to 1000 units of electricity as the equivalent of a ton of coal is really no restriction. When all aspects are considered,

electricity suppliers have not anything over which they can legitimately complain. How many among them are generating current on a coal expenditure of 2·24 lbs. per KW.-hour?

Generation in Situ.

The Bulletin of the Bureau of Mines (U.S.A.) again raises the question as to relative economy to the factory owner of generation of electricity by private plants or obtaining a supply from a central station. Some electrical writers have jumped to the conclusion, and have tried to adhere to it like limpets to a rock, that the small private generating station cannot possibly produce electrical energy so cheaply as the same energy can be supplied by a large generating station. Of course, it all depends on circumstances; and we are thinking that, as things are going in regard to plants and Government schemes, between generation *in situ* (where circumstances are favourable) and the large supply station economy is going to stand out more formidably than ever on the side of the former. In gas-works, for example, where there is plenty of waste fuel, where steam is required for other purposes, or where gas can be supplied for generation purposes at the holder cost of the gas, it does not, unless terms are exceptionally attractive, pay to purchase electric energy from the town suppliers. The same in many factories where steam is needed for other purposes, and electricity is merely a "bye-product" of the steam plant. In the "Bulletin" the case is put thus: If in a steam plant all the exhaust steam were sufficiently utilized, the boilers would still have to be operated at about 90 p.ct. of their former output to supply the heating steam (even if at low pressure) if the engines were shut-down; and the saving in coal would be only 10 p.ct. instead of 100 p.ct. If the purchased power is produced in a central steam plant capable of delivering a KW.-hour for, say, 2½ lbs. of coal, then its use will waste or save in comparison with a private steam plant, as follows: If all the exhaust steam from any private plant is absorbed by heating and process work, no central power station of condensing operation can ever be designed to compete with it in the matter of coal consumption. If the engines in this private plant were all removed, it would still require 90 p.ct. as much coal as formerly to make low-pressure steam for heating; and outside current at 2½ lbs. per KW.-hour would still have to be purchased. If the private plant had been using 8 lbs. of coal per KW.-hour, it would save 0·8 lb. of coal, to replace which it would buy current costing 2½ lbs. Thus, for each pound saved in the private plant, 3⅛ lbs. are burned in the central station. This example represents the extreme case in favour of the private plant. If the same private plant, operating non-condensing, wastes all its exhaust steam, coal will be wasted in the ratio of 8 to 2½ per KW. used. Coal will be saved by substituting purchased power. This example represents the extreme case in favour of the central station current, and the ratio is 8 to 2½, or 3·2 to 1 Generation *in situ* by private plants is likely to develop considerably in the future, despite super-stations.

Gas-Works and Power Supply.

The "Electrician" has recently published a paragraph which shows that it has its eyes on the action that is being taken by gas undertakings in getting hold of coke-oven supplies of gas. Middlesbrough, Leeds, and Sheffield are the large-scale pioneers; Rotherham and other big industrial centres are following on the same line; and so are smaller places. In connection with the Rotherham scheme, our contemporary sees the possibility of gas being available for power at 1s. per 1000 c.ft. It does not say so; but the reflection cannot be a very pleasant one. If we take 16 c.ft. of gas as capable of supplying 1 H.P.-hour at full load, a shilling's worth of gas would give the manufacturer 62 H.P.-hours; whereas a shilling's worth of electricity at 1d. per KW.-hour, would be equal to only 16 H.P.-hours. This is a point that should be added to others recently presented in the "Memoranda" for consideration in connection with the great scheme for the reorganization and concentration of the work of electricity generation and distribution. Manufacturers are out for economy, and not for increased expenditure. From the comparison, it will be seen that a competitive price for gas can be put considerably higher than 1s. per 1000 c.ft. Going farther afield, it is seen that the Newry Urban District Council has been advised by Mr. Arthur E. Porter that an electric supply system worked in conjunction with the Gas Department would be economical; and his estimate of the cost of a suitable scheme is £15,026. For Coleraine, Mr. Thomas, Assoc.M.Inst.C.E., has proposed a water and suction-gas scheme to cost £24,500. But if the mills and factories can be induced to use electric lighting and power, the capital cost would have to be raised to £46,000. The Board of Fuel Research strongly advocates that the gas industry shall be put into a position to make the best possible use of coal and coke for meeting the requirements of industry. The progress of economy in the supply of heat and power to industry cannot be stopped by preferential consideration for electricity upon the part of the Government. The manufacturers and the national interests are the final arbiters in such matters.

Contract System v. Prepayment Meters.

In the cause of economy, Mr. C. S. Davidson, the Chief Engineer of the Barnes electricity undertaking, proposes that prepayment meters for lighting purposes shall be discarded, with all the work and staff entailed by them, and that lighting shall in future be charged on the contract system at 3d. per week per 20-watt lamp (which would mean approximately 16 candle power). Meters, labour, and everything else have gone up in cost; and therefore every line of expenditure that can be ruled-out must be a saving, if there are no contras. Of course, in charging upon such a system, and with no adequate control over consumption, it is certain that consumers with elastic consciences will get greater service for their money than the consumers whose integrity is beyond reproach. Barnes has not been without a limited experience of the contract system. In the district there are about 1000 consumers on the shilling-in-the-slot prepayment system. But already "a large percentage of these meters are obsolete; others are much in need of repair and alteration." Mr. Davidson finds that the revenue from the prepayment consumers is relatively small, and that it scarcely warrants the installation, collection, and maintenance charges incidental to a prepayment tariff more especially as the cost of providing new meters would be very heavy. The prepayment consumers are in the main domiciled in maisonettes. Four of these could have a supply laid on—service cable, joint box, and cut-outs provided—at an expenditure of £3; but for the purpose of checking the electricity used, and collecting money from the four consumers, an additional expenditure for instruments is entailed amounting to £22. Admittedly this is serious. Mr. Davidson therefore reckons that substantial savings are to be effected (which would more than warrant any risk to be taken) by abolishing the meters, the labour, and the material which they call for, and establishing the contract system—but at 3d., instead of 2d., per 20-watt lamp per week. We take it this 3d. applies alike to winter and summer; so that a person who lived at Barnes during the summer and not in the winter months would pay more than his fair share. The 20-watt 16 candle power lamp would give a miserable light in any decent sized room, and probably two or three would be wanted to obtain fairly adequate illumination. Unless it is compulsory to contract for the lamps for the whole year, it would pay consumers to have them cut-off during the summer months (using then a cheaper agent), and only brought into use during the winter. At the rate of 2d. per 20-watt lamp, it is stated that, from the limited number of consumers on the contract system, an average of 2·97d. per unit was received last year; but we see from the "Electrician" tables that the ordinary charge for lighting was 4½d. per unit. Why should these consumers have had preferential treatment? Now there is the proposal for the 3d. rate per 20-watt lamp, which means 13s. a year per lamp, or if 48-candle power were required in a room, 39s. per room per year! Mr. Davidson calculates that the contract consumers used electricity for lighting for 1750 hours per annum. Each 20-watt lamp would consume 35 units per annum; and 13s. being yielded per 20-watt lamp per annum, this works out to 4·45d. per unit. An inverted gas-lamp will give 20-candle power per cubic foot of present-day gas consumed per hour; and 1750 c.ft. at the war price of 4s. would only cost 7s., compared with 13s. for the 16-candle power electric lamp, or 25 p.ct. less light. The scheme is designed to effect an improvement in the financial position of the concern by saving the prepayment meter costs. This is a speculative proposal. There is also a recommendation to raise the price for power and cooking and heating from 1½d. to 2d. per unit, with a revision of the discounts. The contract plan is a curious way of carrying on lighting business; but it all goes to show how in a residential area, the electricity undertaking must in these times have every shred of economy brought into account.

Full Utilization of Power Sources.

In Bulletin No. 102, the Division of Mineral Technology of the United States National Museum, dealing with the need for the conservation of coal and for the universal recovery of the bye-products, states that current demands call for the annual transportation and distribution in America of about 700 million tons of coal. Roughly, two-thirds of the output is used for power generation; the other one-third being employed for the manufacture of coal products (principally coke) and for domestic heating. Much of the demand could be satisfied with no other commodity or form of energy; and any change in the form open to modification can take place only slowly. Meanwhile, the demand is increasing at the rate of some 50 million tons a year. There is no apparent reason why fully co-ordinated development should not look toward a fairly complete recovery of at least the leading bye-products in coal; and this prospect would definitely entail doubling, if not trebling, the fuel efficiency derivable. This means that the present annual coal output could be made to more than double its service. The means for the necessary improvement in coal utilization are suggested to lie in the direction of large gas plants, able to handle all the coal needed by the community, with the production of solid fuel, gas, ammonia, benzol, and tar. Through the principle of "multiple production," coal can be forced to render-up its full quota of service. The principle of multiple production and the principle of electricity are the two most important economic forces that have come into play during the current industrial order. Both have a special bearing on the power supply, as affording untold possibilities of marked betterment. The gas industry weighs but lightly in this connection, as it consumes only about 1 p.ct. of the bituminous coal production. But the principle of multiple production spells the future—the only future, but that a great one—for the gas industry.

SOCIÉTÉ TECHNIQUE DE L'INDUSTRIE DU GAZ EN FRANCE.

VICTORY CONGRESS—METZ-STRASBOURG-MULHOUSE, JULY 4-8, 1919.

REVIEW OF THE PROCEEDINGS.

[FROM OUR OWN CORRESPONDENT.]

THE Victory Congress of the Société Technique—the first general meeting held on any scale since the beginning of hostilities in 1914—was opened at Metz on July 4 under the Presidency of M. FRANCIS ROULAND, the Director-General of the Société du Gaz of Paris.

We are able to publish this week a review of the proceedings at the meeting of the Société Technique de l'Industrie du Gaz en France, which began on July 4. For this, their "Victory Congress," the Council conceived, and carried out, the happy idea of selecting a town in liberated Lorraine—Metz—as the rendezvous; this being the first meeting that has been organized on any scale since 1914. The banquet was honoured by the presence of General Maud'huy and M. Laurent, respectively Governor and Secretary-General of Lorraine.

Owing to difficulties of accommodation, provisions, and travel, the Société were regretfully unable to open their congress this year to visitors from overseas. These difficulties are evidenced by the attendance of only some 250 of a total membership of 828. And it may fairly be assumed that not many would have missed this important occasion who could possibly have seen their way to attending. However, the Société, hoping that conditions will have improved by the autumn, are forming a plan for inviting members of allied Gas Associations to a re-union in Paris. If this can be arranged, it will be a great opportunity for Englishmen to meet their colleagues of other lands, and to interchange ideas; and it will bring them nearer into sympathy with the Société Technique, with whom they exchange greetings at annual meetings, whose Presidents are honorary members of the Institution, and who (at Metz) have just elected Sir Dugald Clerk an honorary member. If the projected visit materializes, the allied re-union at Paris will be an opportunity not to be missed. And there is no host like a Frenchman.

The outstanding feature of the technical communications at the meeting was a paper submitted by M. Sainte-Claire-Deville, on the subject of "Benzol in Coal Gas." In it the distinguished chief of the Paris Gas Company's experimental works gives to the industry some of the results of his forty-nine years of study of the subject at La Villette. Space does not permit of justice being done to the paper in our columns this week; but in future issues, this and other items of interest will be fully dealt with.

GENERAL MEETING.

The first business of the meeting was the election of Sir Dugald Clerk, the President of the Institution of Gas Engineers, and of the President of the Belgian Gas Association, as honorary members of the Society.

Report of the Treasurer.

The accounts having been read and an explanation given of the financial situation, 30 new members were admitted—bringing the total of membership of the Society up to 1828. In spite of the difficulties of gas companies, they had succeeded this year in keeping up their full subscriptions to the Society, which amounted for the year to 30,455 frs. (something over £1000 at the present rate of exchange).

Report of the Committee.

The Secretary (M. Rolland d'Estape) then read the report of the Committee for the year, in which homage was paid to members who had passed away during the year. Among others mentioned were Mr. T. O. Paterson, a former President of the Institution of Gas Engineers, and Mr. W. Williams, of the European Gas Company, who had been members since the years 1890 and 1888 respectively.

A tribute was then paid to the members of the Society who had lost their lives in the service of their country. The Society has instituted a "Golden Book," in which are to be inscribed the names of gas men, great and small, who died on the field of battle or as a result of their wounds, and of the wounded and missing. The list is already of great length, while, unfortunately, still far from complete. The roll of honour on May 1, 1919, was —killed 1881, died of wounds, &c., 391, wounded 153, missing 276.

The congratulations of the Society were then offered to those members who had received distinctions during the war, including, among recipients of the Legion of Honour, M. Boutan, who was President in 1914, and M. Rolland d'Estape, the Secretary.

The report next briefly reviewed the important work of the Committee in connection with the foundation of an Industrial Laboratory, the debenzolizing of gas, and many other important matters. Reference was made to the close relations existing between the Society and the Professional Syndicate of the French Gas Industry. The work of the latter during the war, in connection with the coal crisis, raising of the prices of gas, war damages, &c., had been of very considerable service to the industry. The Society was likewise in cordial sympathy with the Institution of Gas Engineers and the Italian and Swiss Associations, and followed with great interest their work. After four years of waiting, they had now been able to resume their friendly relations with the Belgian Association.

The report concluded with the following words: "We have under consideration a plan for organizing towards the autumn a special reunion at Paris for the members of the technical gas associations of our Allies. We shall in this way be able to give expression to the feelings of *entente* which we have towards them. They, like ourselves, have suffered in the war. Their soldiers, side by side with ours, have fought and conquered under the orders of Marshal Foch. Our thoughts can pass, with theirs, to the graves of the brave men who are sleeping their last sleep on the plains of Flanders, on the Somme, and on the Marne. We have no doubt that all French gas men will reply with generosity to the appeal which we shall address to them in due course to help us in entertaining our guests in a worthy manner."

The New Office Bearers.

The office bearers for the current year are as follows:

President.—M. Laurain.
Vice-Presidents.—MM. Koeuffer, Masse, R. Ellissen.
Secretaries.—MM. Rolland d'Estape and Villiers.
Treasurer.—M. G. Frère.

A Message from the Institution.

During the course of the proceedings the President received and read the following message:

> The Institution of Gas Engineers send cordial greetings and best wishes to colleagues of Société Technique de l'Industrie du Gaz en France, on the occasion of the congress at Metz, and heartfelt congratulations on the victorious peace and the restoration of Alsace Lorraine.—(Signed) DUGALD CLERK, President.

EXTRAORDINARY GENERAL MEETING.

A report by M. Laurain having been read, an extraordinary general meeting was held, which was necessary for the alteration of certain of the statutes. Following the example of the English Institution in the year 1918, the annual subscription was raised from 20 frs. to 40 frs. Owing to the increase in the number of members, and to the importance of the questions with which the Committee are now concerned, the number of its members was considered insufficient, and the meeting decided to increase them from 21 to 27. The vacancies thus created were promptly filled, and the retiring members were also re-elected.

OPENING OF THE CONGRESS.

At the opening of the Congress in the large hall of the Metz Town Hall in the afternoon, the President welcomed some 250 members, expressing his pleasure at being able to hold this first post-war reunion in reconquered Lorraine.

Medals and Awards.

M. Laurent, representing the Commissary of the Republic in Lorraine, proceeded to the distribution of the Government medals which are awarded to meritorious workmen who have at least 30 years' service with one company. Among the recipients of similar awards presented by the Society was a man of 96 years of age, who had four children living of over 50 years. He has been for 56 years with the Rodnez gas undertaking, and is still in their service.

War Diplomas were then distributed. These were instituted in 1918 by the Society, to be given to members of the gas industry who distinguished themselves by bravery and devotion to their duties in times of danger, thereby effecting a continuation of the particular services which were entrusted to them. The brave deeds of several women employees of gas undertakings were cited, and the gallant records of several gas managers were greeted with great enthusiasm.

Prizes for the best papers presented at the 1914 Congress were awarded to M. Grebel, "Comburimetry;" M. Coudelou, "Anomalous Causes of the Water Content in Tar;" M. de la Boulaye,

"Long-Distance High-Pressure Distribution;" M. Grozet, "Small Charging Machine;" and M. Berthelot, "Study of Different Systems of Regenerative Furnaces."

Presidential Address.

M. Rouland then delivered his Presidential Address. It is hoped at some future date to give further details of what was generally acclaimed as a pronouncement of first-rate importance. Suffice it here to say that the author, leaving the leading technical questions of the day for later discussion, gave an admirable review of the post-war position of the gas industry in France, and with clearness and foresight discussed its future difficulties.

REPORTS OF COMMISSIONS.

Manufacture.

This report mentioned how the coal scarcity of 1918 brought with it troubles and difficulties—even causing, in some cases, temporary stoppage of gas supplies. It had demonstrated the importance of various industrial gases, of water gas, &c. Those undertakings, whose contracts permitted the use of such gases, had been able to keep going at certain critical periods, and traditional objections to their use had not been able to stand in face of actual experience. The inevitable continuance of this coal shortage can only be met, states the report, by the strictest economy in all possible directions, and especially by eliminating from contracts all clauses relating to the archaic illuminating power test, or to unnecessarily high calorific values, as has been done in England.

Among several communications which it has received, the Commission specially mentions a device for the easy and rapid examination and regulation of the lower working parts of exhausters of the Beale and similar designs. It is suggested that two oval orifices of suitable size, and systematically sighted, be made in the cylindrical outer cover of the exhauster, at about eighteen inches above the inlet and outlet pipes. These are closed by means of movable inspection plates. Thus, if the exhauster is cut out of the system, by introducing a lamp at one orifice, an examination can be made through the other, and any irregularity in working detected.

Distribution.

Effects of War on Gas Supplies.

The report of the Commission on Distribution traced the effect of the war on gas supplies of various districts, and divided them roughly into three classes. First, there were the undertakings of the interior, which were called upon to satisfy considerably increased demands for gas, owing to the scarcity of other fuel, and to the inception and the development of industries. Such was the case of Lyons, for example, where the annual consumption increased 29 p.ct. from 31 million cb.m. (1095 million c.ft.) in 1913 to 40 million cb.m. (1413 million c.ft.) in 1918. Consumption for industrial purposes alone increased in this period by 66 p.ct. to over 12 million cb.m. (423 million c.ft.). But, while the total consumption increased, it was spread much more evenly over the 24-hour day, and the maximum hourly consumption diminished. When the total consumption increased by just over 21 p.ct., the maximum hourly gas consumption actually decreased by 12 p.ct. Thus was the undertaking enabled to satisfy the demands for gas with an outlay of less than five miles of new mains and services—ten times less than for the same period before the war. Another town in the same category had an increase of 41·5 p.ct., while the maximum hourly load increased by only 11·3 p.ct.

Secondly, there were the towns near the front, which were subjected to frequent and intense bombardments, which had to reduce considerably their gas supply, and even at times to suspend it entirely for a period, and continue it in circumstances of singular difficulty. Such were Dunkirk, Nancy, and Amiens.

Thirdly, the report considered the position of towns not so near the front, which were bombarded at intervals, and sometimes very intensely, either by shell fire or aeroplane. As an example, some interesting details are given of the Paris gas supply.

Some of the methods adopted for the rapid insulation of sections of mains damaged by bombardment are described. In the cast-iron high-pressure mains, gas-bag drillings, closed by ordinary plates, had been made at distances of from 150 to 300 yards when the mains were laid. To ensure rapid access to these, manholes were constructed at distances of about 600 yards, which were closed-in with a wooden covering. In the wrought-iron mains, existing drillings were uncovered, and new ones added to enable a stoppage to be made at about 600-yard distances, where manholes were again provided. In this way the total length of about 25 miles of high-pressure mains was divided into 98 sections. The low-pressure trunk mains, which are almost all of bitumenized wrought iron, and of more than 300 mm. (about 12 in.) diameter, were similarly divided into sections. So, in case of damage, the section affected could quickly be insulated by using the nearest drilling on each side, thus stopping the smaller services taken from the section. This done, in order to avoid having an explosive mixture in a considerable length of main, further bags were inserted as close as possible on either side of the leak before work was begun. The same system was introduced in 142 cases of smaller mains.

Paris Public Lighting.

From August 1, 1914, a beginning was made with the reduction of the number of burners lighted, and the reduction continued systematically until, on April 3, 1915, only 21,312 were lighted out of 69,541 (4975 high-pressure) which existed on the declaration of war. Up to this time, all were allowed to burn the whole night. The number of arc lamps had been reduced to 81. Starting with March 20, 1915—the time of the first air-raids—7160 ordinary and 731 high-pressure burners only were allowed all night, and the remainder were extinguished at 10 o'clock at night. A little later—April 9, 1915—the light was increased in the chief streets and round the Halles, by doubling or trebling the number of points per lamp. This made in all 21,669 points—7944 low-pressure and 391 high-pressure all night, and 13,334 low-pressure extinguished at various times. All lamps were fitted with shades to reduce visibility from above. At the end of 1917 and the beginning of 1918 it was decided still further to decrease the luminosity by providing all lamps with blue glasses of various types. Immediately after the Armistice the street lighting was restored to its pre-war status.

Industrial Experimental Laboratory.

The next report presented reminded the members of the scheme in 1918 for a laboratory for industrial experiments which was to be put at their disposal, and be specially fitted-out for the study and control of combustibles, ammoniacal liquor, tar, and purifying material. Thanks to the continued kindness of the Société du Gaz de Paris, all the installations of the experimental works at la Villette had been placed at the disposal of the Society for this purpose. Thus, under very simple rules, and at a low charge, the members had access for their various experiments to well organized laboratories, and a *personnel* of chemists who had long specialized in this branch of work. This should be a very great benefit. But, unfortunately, in spite of the facilities offered, it seems that up to the present only very limited advantage had been taken of the laboratory; and the expenses of its working showed a loss.

PAPERS AND DISCUSSIONS.

The first paper read was by M. G. Frère, and contained a description of a discharging machine for backed retorts, particularly adaptable to small works. In the next communication, M. R. Coudelou endeavoured to throw some light on the difficult and vexed question of stoppages in ascension pipes. M. E. Sainte-Claire-Deville, the eminent chief of the experimental works of the Société du Gaz de Paris, then presented a long paper entitled "Benzol in Coal Gas," in which he gave some of the extremely valuable results of 49 years of study and research work at La Villette. M. Berthelot followed with some observations on the evolution of the coking industry in the United States, and presented also another paper on benzol. M. Tertre dealt with gas-holder repairs, relating some of his actual experiences; and M. Grebel, in two papers, treated of the long-distance distribution of coke-oven gas, and the importance of selecting suitable burners for industrial heating purposes. Automatic distance lighting received attention from M. Cabrier. An interesting account of the working of the Amiens gas undertaking during the war was given by the European Gas Company's Manager there, M. Defoy. And finally, Mr. Hayman described some of the damage done to the Antwerp works by the German bombardment early in the war.

Space does not permit of justice being done to these interesting communications this week, but they will be dealt with in future issues.

SOCIAL EVENTS AND VISITS.

The Banquet.

Presiding at the banquet of the Society, M. Rouland, in the first toast, coupled the heads of the Allied nations with the name of the French President. He then eulogized M. Mirman, the Commissary of the Republic in Lorraine, who was unfortunately unable to be present. General Maud'huy, the Military Governor of Lorraine, was, however, present to hear himself acclaimed as one of France's greatest and most popular infantry generals of the war. Other toasts were to the Mayor of Metz, the President of the Metz Gas Company, and the President of the Professional Gas Syndicate, who all replied. Finally, M. Laurain was offered the best wishes of all for his year of presidency; and in his reply he requested the retiring President, in the name of all his colleagues, to do them the honour of returning temporarily to the chair for the Allied gas reunion which is planned for the autumn.

Visit to the Metz Gas-Works.

A large number of the members assembled for an inspection of the Montigny works of the Metz Gas Company. The works have two batteries of three and seven settings respectively, with 18 or 12 Bueb vertical retorts each. They work with 12-hour charges of about 8 cwt., with steaming during the last two hours. The production per retort is about 300 cb.m. (10,000 c.ft.), and the output of the works 30,000 cb.m. in 24 hours. Stokers work in two eight-hour shifts of three men each, and between the shifts is a period of four hours, in which nothing is done except watching. Purification is effected in four very large boxes, with hydraulic seals; and there are "Standard" scrubbers for the extraction of ammonia, cyanogen, and naphthalene.

After the visit, the members of the Society were the guests at dinner of the Metz Gas Company. Several toasts were honoured, and a happy incident was the announcement by General Maud'huy that the Ordre de l'Armée and the Croix de Guerre had been awarded to Madame Gallatz Abbert, who, during the war, re-

placed her husband in the management of the Noeux-les-Mines Gas-Works.

Visit to Strasbourg.

On July 6, special trains conveyed the members to Strasbourg, the next day being spent in viewing the sights of the capital of Alsace.

The history of gas at Strasbourg dates back to 1835, when a private individual obtained the contract for the public lighting. Nothing was actually done until a Company from Lyons, the Union pour l'Eclairage au Gaz, succeeded him in 1838. They, in their turn, handed over a much developed business to the Union des Gaz in 1856, whose managers were the Englishmen Edward Goldsmith and W. B. Gregory. Having suffered from the German bombardment in 1870, the works were completely reconstructed by Hodgson Jones and Weill-Goetz. Since 1908, the undertaking has been in the hands of the Municipality, who hold 51 p.ct. of the shares, and the Union des Gaz the rest.

Under the guidance of the Manager, M. Rühlman, the members were able to inspect the works, which have a daily capacity of 75,000 cb.m. (over 2½ million c.ft.), with total storage capacity of 33,000 cb.m. (1,165,000 c.ft.) The gas is made in thirteen settings of nine 21-ft. horizontal retorts each, with Fiddes-Aldridge charging and discharging machinery. Other features of the works are a Klönne condenser, nearly 100 ft. high by 12 ft. in diameter; three Beale exhausters; two Pelouze and Audouin condensers; two tubular coolers of over 3000 sq. ft. surface; two "Standard" ammonia scrubbers; one naphthalene scrubber; and two sets of four purifier boxes, each of 84 sq. ft. surface.

At a dinner given by the gas undertaking, the guests included the Mayor of the city, and General Hirchauer, Military Governor of Alsace, who paid a tribute to the national economy of the gas industry, and the magnificent services it had rendered to the country during the war.

Excursion to Mulhouse.

The programme, so skilfully arranged by the Committee, in face of all difficulties of travel, accommodation, and food, concluded with an excursion to Mulhouse, an industrial and manufacturing city which had remained out-and-out French in spirit, in spite of the forty-eight years of German occupation. The very gas-works, which the members visited, hoisted a tricolour on the entry of the French troops on Nov. 17, 1918, which had been hidden away since 1870 against the great day.

The gas-works, which were rebuilt, in essentially French style, in 1899, are well laid out, and situated near railway, tramway, and canal. The daily capacity is just over a million cubic feet; the carbonizing plant consisting in ten settings of nine inclined retorts. The most striking feature of the works is the manner in which the comfort of the employees is studied, and the accommodation provided for them.

M. R. Ellissen, the Manager of the company, and his family entertained the visitors charmingly, and in their presence presented to the employees medals which had been awarded by the Society. The sights of the city were viewed, and a visit made to the cemetery of Modenheim, where are buried side by side the French and Germans who fell in the first attack on Mulhouse in August, 1914.

Vertical Retorts at Meriden.

An illustrated account of an installation of Woodall-Duckham vertical retorts at the Meriden (Conn.) Gas-Works has appeared in the American "Gas Age." The retort-house, which is 66 ft. long by 46 ft. wide, contains three benches of four retorts each, a 100 H.P. waste-heat boiler, a 165-ton coal-bunker, and two coke-bunkers holding 50 tons. The boiler utilizes the waste heat from the bench firing, and is located on the platform with the benches, and so arranged that the flue gas can be bye-passed to the chimney if desired. From the coal-bunker the coal is drawn into measuring and charging magazines every two hours. From the coke-bunkers, the gas-producer fuel is drawn every four hours, and weighed. Coke is discharged from the retort-hoppers every two hours, and weighed on a portable conveyor feeder. The ashes from the producer grates are discharged by gravity from the producer ash-pits once a day. Two men per shift do all the work in the retort-house. Two foremen cover the three shifts, and help out at times when necessary. The nominal capacity of each retort is 62,500 c.ft. per day, or for the entire house 750,000 c.ft. With dry ¾-in. screened Pittsburgh coal, the capacity per retort has reached 80,000 c.ft. a day; while with wet slack coal it has dropped to 55,000 c.ft. The coke produced from a net ton of coal weighs 1400 lbs., or 70 p.ct. yield. The producers use 280 lbs. of this coke per net ton of coal carbonized. The total coke breeze averages 20 p.ct. of the coke; and all of it is used under the boilers of the electric light station. The coke has been found to be excellent for domestic fuel and for water-gas manufacture, because it is both dry and clean. The coke breeze also makes a first-rate boiler fuel, because it has been produced without quenching, and is therefore absolutely dry.

Wills.—Among wills recently proved is that of Colonel James Le Geyt Daniell (for many years Chairman of the Malta and Mediterranean and the Ottoman Gas Companies); the gross value being £20,511. Mr. A. J. Walter, K.C., who was killed on the Underground Railway last April, left estate of the gross value of £78,563.

HYDROGEN MANUFACTURE FOR AIRCRAFT USE.

IN view of the recent successful Transatlantic flight accomplished by "Airship R. 34" to America and back, it will no doubt be of interest to many readers to know something concerning the method of production of the hydrogen gas with which this airship was inflated at Messrs. W. Beardmore's airship station at Inchinnan on the Clyde, where she was built; and, further, they may like to know that an old-established firm connected with the gas industry—namely, Messrs. Samuel Cutler & Sons, Ltd.—have been closely associated with the design and construction of the plant and apparatus for producing the hydrogen, and delivering it to the airship in the shed where it was constructed.

There are several different and very distinct methods of producing hydrogen gas. Those principally adopted for the inflation of airships and balloons are the "Silicol Process" and the "Iron Contact Process," in both of which Messrs. Cutler have established considerable experience and have the construction of about a hundred plants to their credit. The "Silicol" system of hydrogen manufacture is a patented process, owned by Messrs. Vickers, from whom Messrs. Cutler have secured manufacturing licence. The process has only been developed on a practical scale in this country during the war. It has been largely used by the Admiralty, who at the commencement of the war approached Messrs. Cutler in regard to hydrogen requirements. A trial plant was designed and erected at Messrs. Cutler's Millwall works to produce 10,000 c.ft. of "Silicol" hydrogen per hour.

Mr. Butterfield, the well-known consulting chemist, was then invited to investigate the chemical reactions taking place in the production of the gas from the "Silicol" material, and also to report generally on the process, with a view to obtaining the greatest efficiency from the plant. The following is a brief extract from a report he made upon the subject:

"Silicol" is a trade name for a material which consists chiefly of silicon. The silicon in it is alloyed with a small proportion of iron; and the commercial "Silicol" appears generally to be a ferrosilicon containing 75 to 85 p.ct. of silicon, and a small proportion of aluminium and/or magnesium or other metals, some of which were probably used in the production of the silicon in the electric furnace.

Silicon—the element of which silica (pure quartz) is the oxide—is the chief active constituent of "Silicol" so far as hydrogen production is concerned, though most of the other ingredients or impurities of "Silicol" will also yield some hydrogen in the generator. Silicon is unacted-on by acids, but reacts with solutions of caustic alkali heated to about 160° to 180° Fahr. In the preparation of hydrogen from silicon, it reacts in the generator with caustic alkali (soda) and water—the products being hydrogen and silicate of soda (water-glass). The hydrogen produced is free from any considerable proportion of other gases or impurities. Silicate of soda is by no means a definite compound; the ratio of silica to soda in it varying according to the mode and conditions of its production.

The materials run into the generator during the trial were 350 lbs. of "Silicol," 800 lbs. of caustic soda, and 125 gallons (1250 lbs.) of water. A sample of "Silicol" when discharged into caustic soda solution corresponding with these proportions, yielded 23·45 c.ft. (measured at 60° Fahr., 30 in., and moist) of gas per pound—equal to 2625 c.ft. per cwt., or 52,500 c.ft. per ton. Pure silicon should yield 27 c.ft. of hydrogen, in the same conditions. Hence the "Silicol" may be regarded, for the purpose of hydrogen production, as containing the equivalent of 87 p.ct. of its weight of pure silicon.

The sample of caustic soda contained approximately 96 p.ct. of real caustic soda (sodium hydroxide, NaOH) or 74·3 p.ct. of anhydrous soda (Na_2O). The spent liquid or sludge discharged from the plant contained about 4·8 p.ct. of caustic soda. Computing the volume of this sludge by deducting from the volumes of the materials used the proportion expended in the formation of hydrogen, and lost as steam in the gas, the volume of sludge would be about 180 gallons (assuming it is not diluted by flushing water). There would, therefore, be about 100 lbs. of caustic soda left in the sludge and unutilized for the production of the hydrogen. The volume of water used in the production of hydrogen would be about 39½ gallons.

The materials actually used in the production of hydrogen in the trial run were, therefore, "Silicol" equivalent to 305 lbs. of silicon; caustic soda equivalent to 518 lbs. of anhydrous soda (Na_2O); and 395 lbs. of water. These proportions correspond closely with the equation: $4Si + 3Na_2O + 8H_2O$ (or $4Si + 6NaOH + 5H_2O$) = $3Na_2O, 4SiO_2 + 8H_2$, which would actually require 308 lbs. of silicon, 512 lbs. of anhydrous soda, and 396 lbs. of water.

This equation would, therefore, appear to represent the changes which go on in the "Silicol" generator. The sodium silicate in the sludge may not be a definite body of the formula $3Na_2O, 4SiO_2$, but may be a mixture of two or more sodium silicates of different composition, but giving a mixture in which the proportions of soda and silica are, as a whole, those corresponding with the formula.

The conclusions to be drawn from these figures are that the "Silicol" was entirely used up, but that about one-eighth of the caustic soda employed was in excess of the quantity actually required for the reaction. The excess of soda used probably has a two-fold purpose—viz., to ensure the complete exhaustion of the "Silicol," which is by far the most costly of the raw materials, and to ensure a sufficiently high temperature in the generator to start the reaction without the application of external heat. It should be borne in mind that the bulk of the hydrogen is formed from the water used for solution, and not from the sodium hydroxide. Hence, when once the reaction is well started, it should not require a large expenditure of soda to maintain it.

The heat development in the reaction which occurs in the generator cannot be stated from known data, as the heat of formation of sodium silicate of any composition does not appear to have been determined.

The greatest evolution of heat in the solution of caustic soda occurs with about 800 lbs. of caustic soda to 180 gallons of water.

The sludge discharged consists of a supersaturated solution of silicate of soda, containing iron and other impurities, with an excess of caustic soda. Silicate of soda has various uses, among which the most important are the manufacture of artificial paving stone (slabs or flags); for the weather-proofing of stonework; and as a medium for the preservation of eggs. For most uses the iron and other impurities would not be a serious detriment. But the excess of alkali would be; and it would be necessary to remove or neutralize it. Silicate of soda is also used to a certain extent as a filler in soap manufacture; and for making certain grades of soap, the alkali could be readily utilized without previous removal from the silicate of soda.

On the completion of the investigation made on the trial apparatus, a series of standard plants was designed and constructed, ranging from a portable type of 3000 c.ft. per hour capacity—illustrated in fig. 1—up to stationary plants of one million c.ft. per

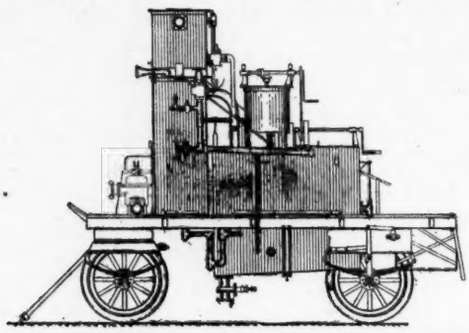


Fig. 1.—Portable Hydrogen Plant, Producing 3000 c.ft. per Hour.

diem capacity—see fig. 3. It is the latter (or largest size) plants which were installed at the Inchinnan and Selby airship stations, where the two giant airships, R.34 and R.33, were constructed and inflated.

Fig. 1 illustrates "Type A. Portable Class," which produces 3000 c.ft. of hydrogen per hour, and is a self-contained complete apparatus entirely hand-operated, and all mounted on a chassis. Fig. 2 is a "Type B. Fixed Plant." It produces 10,000 c.ft. of hydrogen per hour. The gearing is mechanically operated by an electric motor. The space occupied by the plant is 20 ft. by 16 ft. Fig. 3 is a "One Million per Diem Plant," and comprises two generators and one set of accessories common to both—the whole occupying a ground space 34 ft. square.

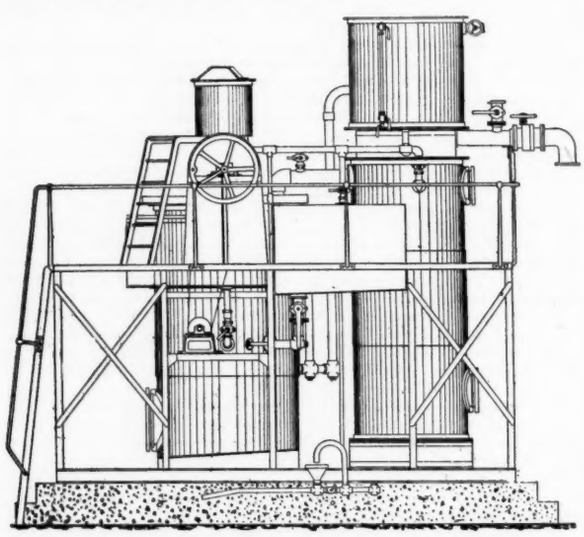


Fig. 2.—Hydrogen Plant for a Production of 10,000 c.ft. per Hour.

The cost of producing hydrogen by the "Silicol" process is considerably greater than for gas produced by the "Iron-Contact" and water gas system, from the point of view of actual cost per 1000 c.ft. But there are other very important considerations that qualify the comparison, in so far as airship inflation is concerned—especially the small cost and the portability of the plant; the greatly reduced labour in attendance; the entire absence of fuel (the process being self-heating from its chemical reactions); and the very rapid production of the gas. Also the plant can be started-up and shut-down without any preliminary preparations or standing expenses, and can be producing gas in great quantity at a few minutes' notice.

The cost of a complete installation of "Silicol" plant is less than 10 p.ct. of that involved in a water-gas and "Iron Contact" plant made to produce the same volume of hydrogen; and the

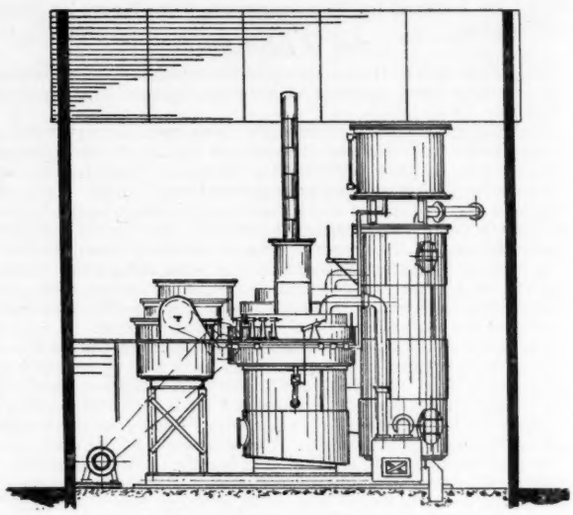


Fig. 3.—A One Million Cubic Feet per Day Hydrogen Plant.

labour for operating is somewhat in the same proportion. Also an important feature is that with such rapid production, no great gas storage is required—the hydrogen being used as produced. It, further, does not require to be passed through lime purifiers, as is the case with the other system. Thus for airships even of the largest dimensions contemplated, it is within the bounds of a commercial proposition that "Silicol" hydrogen, although considerably exceeding in initial cost that produced by the water gas "Iron Contact" system will be favourably considered. The purity, which has so important a bearing on the lifting power of the hydrogen, is a matter which also requires to be taken into account, and "Silicol" hydrogen is practically pure as produced.

The "Iron Contact" process may be seen at its best at the large Admiralty air station at Pulham, in Norfolk, where R 34 was landed on her return from America.

The installation there is on a system introduced and developed by Messrs. Cutler for the Admiralty, and known as the "Monobloc" water gas and single generator system. The plant is in four complete and independent units, any number or all of which can be simultaneously producing, and by continuous working under well-organized conditions, the hydrogen is produced with great regularity and economy. Storage is provided for 1½ million c.ft. of hydrogen.

We hope now that the reserve imposed by war conditions is being relaxed, to shortly be in a position to publish further details of this important and interesting installation.

Charging for Complaint and Trouble Service.

"Whoever heard of anyone calling on an oil company to come and repair his motor-car free because he purchased his gasoline from them?" asked Mr. C. A. Nash, of the People's Light Company, of Davenport, in a paper submitted by him to the Iowa District Gas Association. The question he was laying before his audience was whether it is desirable to charge consumers for complaint and trouble services which formerly were given free; and, if so, to what extent this policy should be employed. Should one charge for leaks, freeze-ups, and adjustment, regulation, or cleaning of appliances—in fact, for all service calls—or should one charge for only part of these? He argued that customers pay for services, and should pay for all they get, if only out of justification to those who, while paying the same amount for the gas, rarely, if ever, call for attention. The consumer does not see what he buys, but pays for the service rendered—not for several thousand cubic feet of gas, but for the cooking and lighting the gas enables him to do. He should also pay for the upkeep. Most of the consumers are willing to pay a reasonable charge, and think the company justified in making it. The others should be asked to do the same thing. However, when a customer is charged for a service which he has hitherto always had free, it is absolutely essential that he secures a high-grade thorough job, so that he will feel he has received his money's worth. Service charges are fully justified by any fair-minded person, if they are carefully explained.

Sea-Borne Coal for Gas Undertakings.—The necessity of substituting sea-borne coal from Durham and Northumberland for the rail-borne coal supplied during the past year from Yorkshire and the East Midlands, is the subject of an Order by the Controller of Coal Mines. The Order will apply, as from Aug. 1, to gas companies, power stations, and users generally of manufacturing coal. It makes it imperative to give to this branch of the trade a far greater tonnage of coal—attention to transport by sea being recognized as the only solution of the difficulties of railway transport.

SOCIETY OF CHEMICAL INDUSTRY—ANNUAL MEETING.

CHEMICAL ENGINEERING GROUP.

THE Annual Meeting of the Society of Chemical Industry was held in London last week—under the presidency of Prof. HENRY LOUIS—the opening proceedings taking place at the Mansion House, on Tuesday morning.

THE PRESIDENTIAL ADDRESS.

In his address, Prof. Louis remarked that when one looked back upon what the British chemical industry was before the war, and on what it had accomplished during these five strenuous years, some faint idea might be gained of what the chemist's share had been in the great conflict. He proceeded to give a summary of some of the most important of these achievements.

In a general review of the chemist's war work, he said, it would seem almost inevitable to assign the first place to the production of explosives, which is necessarily the undisputed domain of the chemist. At the outbreak of war, our manufacture of explosives was practically confined to those used for mining and other industrial purposes. For military purposes, we made small quantities of gunpowder, guncotton, cordite, and picric acid, though it is true that the latter, produced by a somewhat primitive process, was used mainly as a dye, and to a less extent for service practice. The high explosives for the bursting charges of shells were mainly picric acid and a little trinitrotoluol; the total quantity of the two explosives amounting to less than 50 tons per week. Five years ago, we found ourselves with neither the plant nor the experience required to produce a whole range of indispensable substances—such as trinitrotoluene, trinitroxylene, dinitrophenol, tetryl, synthetic phenol, acetone, &c.—all of which are organic derivatives, and can therefore only be made by manufacturers accustomed to deal with this branch of the industry. The immense amount of research and experiment that was needed before these manufactures could be successfully set going on the required scale of magnitude is difficult to conceive, except by those actually engaged in the work.

In the manufacture of T.N.T. entirely new methods had to be devised and worked out on the required manufacturing scale, and the requisite plant for its production designed and constructed. To obtain the enormous quantity of toluene required (corresponding to a production of 60,000 tons of T.N.T. per annum) was one of the first of our difficulties. In addition to its recovery from coal gas and from the distillation of coal tar, a number of methods for its production were studied, though, as it happens, it never became necessary to put them into practice. The demand for picric acid soon rose to about 1000 tons a week. It had become evident at an early stage of the war that the supplies of coal-tar phenol would be far below our requirements, and other sources of supply had to be found. We had never made synthetic phenol in this country; and a vast amount of experimental work had to be done before its manufacture from benzene through benzene sulphonic acid could be successfully undertaken.

Even with these developments, our production of explosives was less than half our requirements. Here, again, the resourcefulness of our chemists came to the rescue by the invention of a new explosive, amatol, consisting of a mixture of T.N.T. with from two to four times its weight of ammonium nitrate. This explosive, when fired with a suitable fuse, is even more powerful than T.N.T. But a vast amount of experimental work had to be done before a properly modified fuse could be devised and rendered practicable. Again, the demand for huge quantities of ammonium nitrate for this and other purposes could no longer conveniently be met by the older methods of manufacture, and new and more direct systems were worked out. Three processes were employed: (1) The interaction of sodium nitrate and calcium chloride, giving calcium nitrate, which in turn was made to interact with ammonium sulphate; (2) the ammonia-soda process; and (3) the interaction of sodium nitrate and ammonium sulphate. By these means 3000 tons of ammonium nitrate were produced weekly.

During the war, we have practically emancipated ourselves from reliance upon Germany to the extent that all the dyes we require can now be made, and are now being made, in this country. So far as concerns the work of the chemist and the manufacturer, the problem of producing our own supply of dyes may be said to have been solved; and the admininistrative and financial aspects of the question do not concern us for the moment.

Another important chemical industry, the advance in which is a matter of public knowledge, is the glass industry. Before the war we produced heavy glassware, but very little fine glass and practically none for scientific or optical purposes. Elaborate researches were at once set on foot; the problem in this case being complicated by the fact that the raw materials available in this country were not identical with those obtainable abroad. Nevertheless, by patient and persevering investigations, the difficulties were gradually overcome, and optical and scientific glass of good quality is now being regularly produced in this country.

On Wednesday last, the Chemical Engineering Group held its first annual conference, as part of the annual meeting, at the Salters' Hall, London, E.C. The conference continued throughout the day; and Prof. HENRY LOUIS, Dr. M. O. FORSTER, and Dr. CHARLES CARPENTER took the chair at various times during the proceedings.

The PRESIDENT, who opened the conference, said it came at a psychological moment, in that it dealt directly or indirectly with fuel economy, and all engineers were keenly alive to the importance of exercising the utmost economy in the use of fuel, both from the commercial and technical points of view. It had been said that coal in the past had been too cheap, and that it had not been treated with the respect it deserved. But he did not think this reproach would be uttered any more in the future. Not only were we faced with a great increase in the price of coal, which was not an unmixed evil, but we were face to face with a very serious diminution in the output, and this, on the contrary, was a matter of the utmost gravity. It was only quite recently that the public had been rudely awakened to the fact that our coal output was falling off; and what had happened was a vindication of the views expressed by many people when the Minimum Wages Act was introduced, for with every successive increase in the minimum wage, there had been a corresponding diminution in output. The coal industry was the only one, he believed, which had a minimum wage definitely fixed; and it was the only one in which the output per man was steadily falling. He, personally, was convinced that our low output of coal was due to the high minimum wage; and while the position that whether a man liked to work or not existed, we should necessarily be faced with low production. It was, however, their duty to make the best of the conditions as they existed, and that, be the output large or small, it was utilized to the best advantage. He therefore looked upon the work of the conference as of importance, not only to the chemical industry but to the nation at large.

WASTE HEAT BOILERS.

By Captain C. J. GOODWIN, A.C.G.I.B.Sc. (England), Assoc. M.Inst.C.E.

Dealing with the subject of waste-heat boilers and pulverized fuel in chemical factories, the author said that the gas and coke-oven industries are probably the principal users of fuel in the chemical industry; and it seems surprising that so little has been done in the past to utilize fully the available heat in suitable cases. In gas-works, coke is no longer a drug upon the market; and steam is required for producers and various processes. In these and in coke-oven plants working regeneratively, the objection may be raised that, if more heat were taken out of the gases, their temperature would be insufficient to maintain a proper draught. Induced draught would overcome this objection; and given suitable conditions for utilizing the steam, waste-heat boilers should be quite remunerative after allowing for the power required to drive the fans.

An illustration was given showing one possible arrangement of a waste-heat boiler designed by the Bonecourt Waste Heat Boiler Company, Ltd., and ordered as a trial installation for a standard set of four continuous vertical retorts working under natural draught. By adjusting the dampers, the volume of gas passing through the boiler can be altered to correspond with working requirements. The gases enter the boiler at 700° C., and are purposely designed to leave at 300° C., in order to have sufficient draught in the chimney. A better utilization of the gases would be possible by using induced draught. A boiler working with the waste gases from a single retort-setting will give 500 lbs. of steam per hour at 100 lbs. pressure; so that a gas-works comprising 60 retorts could raise 7500 lbs. of steam per hour from and at 100° C., in return for a capital outlay of about £4000, and with relatively small operating costs. When the enormous number of gas-retorts, coke-ovens, and also future low-temperature distillation plants are considered, it is evident that waste-heat boilers should be increasingly adopted in such works, and in connection with the utilization of the sensible heat in gases produced by super-power stations and bye-product works of the future.

Taking the case of a gas-engine, tests made by the Institution of Civil Engineers show that at full load about 38 p.ct. of the total available heat in the gas is exhausted into the atmosphere, and about 30 p.ct. lost in the water-jacket and by radiation. Taking a 1000 H.P. gas-engine, the equivalent full load steam production based on 60 p.ct. thermal boiler efficiency is 2250 lbs. of steam per hour, equivalent to about 280 lbs. of coal. Allowance must be made for interest, depreciation, maintenance, &c.; but taking coal at 35s. per ton, and 3500 working hours per annum for the gas-engine, the net saving would be about £450 a year on a capital outlay of £600 to £800. An appreciable additional saving can be effected by using the preheated water from the jacket of the gas-engine cylinder as boiler feed.

Important advantages are claimed for the "Still" combined internal-combustion and steam-engine. The principles involved may be considered as a logical extension of the method of utilizing the waste heat from gas-engines outlined above; and comparisons of prime and operating costs will no doubt lead to considerable controversy. It would seem, however, that for chemical works

where gas-engines are installed, the use of a waste-heat boiler is usually to be preferred.

DISCUSSION.

Captain GOODWIN remarked that they had only to remember that many prominent members of the gas industry belonged to the Society, and to look at their work, to know that the gas industry would do its full share as regards economy in fuel utilization. But could they say the same of the chemical industry generally, or of the rest of the chemical industry. It was a debatable point whether chemical factories before the war were using their fuel in such a way that, after allowing for all charges, and bearing in mind the total amount of plant and capital involved, the cost was the lowest possible in relation to output. In the past, chemical factories had not done their best so much in the national interests as in their own individual interests; but he thought in the future they would be judged by what they did in the national interest. Referring to the use of powdered fuel, he said that 11,000,000 tons were being burned annually in America; and it had to be taken into account as a serious factor in our coal situation.

Dr. W. R. ORMANDY said that while it was true that in the past and at the present time a great deal of fuel was being used uneconomically, there was at the same time no possible prospect of being able to use it more economically. It required careful examination to find out at what point it was worth while putting in induced draught; but if it made possible the use of fuel such as roofing shale, containing only 55 p.ct. of combustible material, which it would be utterly impossible to use with the ordinary type of stoker, then the question should be seriously considered. If they could use a fuel which had previously been subjected to low-temperature distillation, it opened up great possibilities, as the low-temperature distillation of low-grade fuel was in many cases rendered uneconomical, because, although the value of the oil might be sufficient to pay for the entire costs of the process, some use must be found for the high ash residue. If this residue was easily pulverizable, it opened up possibilities for a combined low-temperature process, which would enable large quantities of wasted fuel to be made use of.

Mr. L. C. HARVEY said the scope for economy in coal-mining plants was seen in the fact that he knew of one Lancashire boiler installation at a mine where only 3 lbs. of water were evaporated per pound of fuel. The present position with regard to the price of coal made the use of pulverized fuel a very attractive proposition. In 1903, a certain grade of fuel was 7s. 6d. per ton; in 1919, this same coal was 30s. If the 6s. rise came into operation, this would be increased to 36s., and possibly more. In 1903 a pulverized coal installation would have shown a net profit, after deducting for all expenses, interest, and depreciation on plant, of £1875 per annum. This was based on an installation burning 250 tons of coal per day. At the present time, with coal at 30s., for the same size plant the saving would be £21,502; so that whereas in 1903 it would have been a very hard business to suggest an installation for pulverized coal, to-day it ought to be very much more attractive.

Captain F. S. SINNATT considered that pulverized fuel ought to have a very great future. In Lancashire, material suitable for the purpose was being wasted every day. In one case, practically the whole field was covered with cannel coal of an inferior quality; the quantity of ash being anything from 20 to 70 p.ct. An attempt was made to use it during the war for low-temperature distillation; but it was not a complete success. On the other hand, although this material was very hard to break, it was extraordinarily easy to grind. This brought him to his next point—viz., that a great deal more study was needed of the chemical characteristics of our coals.

Mr. H. M. RIDGE said that the use of waste-heat boilers must not be assumed to be a panacea for all evils. In a case he had had to deal with, in which the operation necessitated the waste gases leaving the furnace at about 300° or 400° C., he had made arrangements, and reduced the fuel consumption, so that the temperature of the stack gases was about 250°; and he could not have obtained the same financial result by passing the hot gases in the first place into waste-heat boilers. This could be done either by pre-heating the secondary air or actually reducing the temperature. It was preferable to pre-heat the secondary air; and he had done the same thing in a number of installations working on a comparatively small scale, and obtained a good efficiency. In one such case, using only a few tons of coal per 24 hours, the waste gases left the furnace at about 1090° or 1100°; and by pre-heating the secondary air to between 630° and 850°, the reduction in the coal consumption was more than 50 p.ct.

Captain GOODWIN, replying to the discussion, said there ought to be some organization which would collect the dust and smalls and concentrate them at some central point in every large town.

DIFFERENTIAL PRESSURE METERS.

By J. L. HODGSON.

A summary of the more interesting features of problems connected with differential pressure meters for measuring air, gas, and steam flows was given by Mr. Hodgson, who stated that he has developed a single instrument for use with the Pitot tube, the differential pressure in all other cases being obtained by means of constrictions placed in the pipe-line, which can be designed to give the differential pressure required by the instruments over a very large range of maximum velocities.

The instrument developed for use with the Pitot tube is termed the curved tube manometer. It consists of a reservoir containing oil, which is connected direct to the upstream pressure hole, and a curved tube so shaped that equal increments in the velocity past the Pitot tube will cause equal movements of the oil meniscus along its length, which is connected to the down-stream pressure-hole. The manometer is so designed that it can be supplied to work at any maximum head between 15 and 120 mm. of oil. Owing to the equal-spacing scale, accurate readings can be taken down to one-ninth or one-tenth of the maximum flow.

A larger type of the same instrument is now being developed in connection with high-pressure gas distribution, which will enable accurate readings to be taken down to one-twentieth of the maximum flow.

One of the illustrations referred to a steam and air meter, and was similar to that reproduced in the "JOURNAL" for May 6 [p. 297], when Mr. W. W. Townsend described the water-gas plant at Colchester to the members of the Eastern Counties Gas Managers' Association. On that occasion, Mr. Townsend gave some particulars of the instrument—made by Messrs. George Kent, Ltd. Indicating and recording instruments were dealt with, and the scheme was explained of a counter meter which takes into account variations in the specific gravity of the gas.

In conclusion, the author remarked that he had gone only briefly into the theory and construction of the simpler differential pressure meters for which he is responsible. Their accuracy under working conditions is within 2 p.ct. at full load, and within 4 p.ct. at the lowest loads they are designed to measure.

The CHAIRMAN (Dr. M. O. Forster) said there was plenty of scope for discussion on this paper; but in justice to the next author, Dr. Bone, he would ask those who desired to discuss to send in their contributions in writing.

RECENT DEVELOPMENTS IN SURFACE COMBUSTION BOILERS.

By Prof. W. A. BONE, D.Sc., F.R.S., and P. St. G. KIRKE, M.A., Assoc.M.Inst.C.E.

Prof. Bone said he proposed to give a review of the development of a subject in which personally he was a good deal interested, but which had been mainly worked at during the last two or three years by Mr. Kirke. He proposed first to review the investigation as a whole, and then to mention some developments which had taken place since the Bonecourt system of surface combustion was first introduced.

He explained the characteristics of the system whereby an explosive gaseous mixture is forced on to an incandescent solid. As is now well known, the early experiments and practical application of the system employed tubes 3 ft. long and 3 in. diameter, packed with a loose granular material—a refractory fire-brick. The first experimental boiler was made up of ten such tubes fixed horizontally in a cylindrical steel shell; and it gave an efficiency of 94·3 p.ct. In 1911, a much larger plant was erected at the Skinningrove Iron-Works; the boiler being 4 ft. long and 10 ft. diameter, and contained 110 tubes. Two of these were ultimately put up; and they worked in conjunction with a feed-water heater. In July, 1912, the boilers, unlagged, gave an efficiency of 92·7 p.ct. Certain difficulties were afterwards met with in this plant; but no trouble was experienced with the evaporating portion, nor with the gas-feeding arrangements. Illustrations were given of this plant, and also of others, notably those at the printing works of the "Illustrated London News" and at the works of Messrs. Hans Renold, Ltd., Manchester.

Dealing with the later modifications, Prof. Bone pointed out that these had taken the form of lengthening the tubes, and first increasing and afterwards reducing again their size and filling them by another form of refractory surface. The latter had now been adopted on account of objections which had been taken to the loose type of packing originally introduced, and which required renewal once a year, and, moreover, required to be very carefully packed. Consequently, a rigid system of packing was employed, consisting of moulded blocks placed at varying angles. The tubes were made 6 in. diameter, instead of 3 in. By the use of this form of packing, they were able to use producer gas without any inconvenience, because, with a closely packed tube such as that used originally, it was impossible to pass a tar-laden gas through without clogging the packing. In this form, the boilers could be used with producer gas or ammonia recovery plants. The use of this rigid system of packing also had the effect of reducing the temperature of the packing in the front part of the boiler to about 850°. Two boilers fitted with these improvements had been put down in the Birmingham district in 1914 for generating steam from coke-oven producers, and had been working continuously ever since. These boilers were 10 ft. diameter by 12 ft. long, and contained each 38 tubes of 6 in. diameter. With this rigid system of packing, each tube was provided with its own gas supply; and although these two boilers had been running for five years, none of the tubes had had to be renewed. The only criticism of the boiler was that they did not consider the separate supply of gas to each tube could be regarded as finality, and, further, that it would be an advantage if the tubes could be made of smaller diameter and of greater length, in order to increase the heating surface of the boiler. It was in one sense an advantage to have a separate gas supply to each tube, if the boiler was subject to variations in load. With a constant load, however, there was an advantage in dispensing altogether with separate control; and a system had been devised for doing this. It consisted of a chamber through which the gas was supplied which was controlled by one valve, and a perfect mixture for combustion could be maintained in the boiler tubes by adjusting the speed of the fan to the pressure, so that the boiler could be fed at any desired load.

Another modification was that, by the addition of a superheater, the system could be made applicable to large power plants, which was impossible in the early stage of development. Experiments

had been made and results had been obtained which showed that, with a boiler working at 100 lbs. pressure per square inch, the steam could be superheated to a temperature of 192° Fahr., or a total temperature of 533° Fahr.; while at the same time the temperature of the products leaving the system was reduced to 442°. Superheats of 340° were obtained on other experiments.

Further experiments had also been made with tubes of 3 in. diameter and smaller and of greater length, and a new form of iron spiral packing had been introduced with tubes of 2 in. diameter. A Lancashire type of boiler had been constructed, 6 ft. by 18 ft., and containing 2 in. tubes, fitted with superheater and feed-water heater and using the spiral packing; the boiler being controlled by one valve for the gas supply to all the tubes. This boiler was capable of evaporating 20,000 lbs. of water from and at 212° Fahr. on coke-oven gas and 1500 lbs. of water on producer gas. The efficiency of this was about the same as that of the original Skinningrove boiler.

The intention was, said Prof. Bone, to build three types of boilers according to the circumstances in which they were to be used; the three types being the short boiler with loose packing, and the other sizes of boiler and tubes with the two systems of solid packing referred to. The Skinningrove boiler from the technical point of view was quite good; but it was more costly to make for a given steam output than the later types. While he did not anticipate that users would wish to put in the more expensive type, if for reasons of space the short type of boiler was desired, they would be prepared to instal them and guarantee their successful operation and their high efficiency.

DISCUSSION.

The paper was discussed in the afternoon, when Dr. Charles Carpenter presided.

Mr. H. J. PING (of Messrs. Hans Renold, Ltd.) said that he put down a Bonecourt boiler three years ago, fitted with solid spiral packing, and it had given great satisfaction in addition to having many advantages in regard to coal supply, ash collection, space, and so on. He was not going to say anything about the consumption of gas, as it would be quite unfair to the makers, because the gas bill had gone up tremendously owing to the fact that the price had been increased to 5s. per 1000 c.ft. In addition to this, he had to take whatever gas was supplied; and it had been very poor stuff. For this reason he thought it would be unfair on his part to give a figure of the consumption of gas per unit of water evaporated. At the same time, he urged all those in the chemical industry who wished to be up to date to keep their eye on the Bonecourt boiler.

Dr. W. R. ORMANDY asked what were the limits of the poorness of the gas which could be employed, and had it answered to employ pre-heated air when using gas of a very low calorific value—say, 100 B.Th.U.? He also asked whether the overall efficiency of a boiler run on producer gas would show any advantage over a direct-fired boiler run economically, unless the producer was able to use a low-grade fuel which could not be employed upon modern mechanical stokers. It was this aspect of affairs which was largely going to settle whether it would pay to instal this type of boiler.

Dr. BONE said he would leave the bulk of the reply to Mr. Kirke, who had been more intimately associated with the mechanical aspect than he had—having been responsible during the past two or three years for the designing of the mechanical alterations. In reply to Dr. Ormandy's question as to whether gases of low calorific value could be used, he had already explained that he was working with ammonia recovery plants; the gas being about 140 B.Th.U. Possibly Dr. Ormandy referred to low-grade blast-furnace gas. Very soon after the earliest trials, he made at the Skinningrove works some experiments with boiler tubes on blast-furnace gas, and found that he could not get the surfaces to glow sufficiently by feeding in the gas with the proper proportion of air. He afterwards started the tubes with a little coke-oven gas in order to get the material in them to a sufficient state of glow, and then turned on the gas and air mixture. The tubes then worked quite satisfactorily. As to the question of putting down a boiler for blast-furnace gas in preference to a steam generating plant, he would be quite frank and say that the blast-furnace gas would have to be cleaned before it could be used in any form of this boiler; and if the gas had to be cleaned, he thought they would get greater efficiency by putting it straight into an internal combustion engine than into any boiler system. There might, however, be cases where the employment of internal combustion engines and blast-furnace gas would not be desirable. In that case, he thought there would be no difficulty, if the gas was cleaned (say) by the electrostatic method, in using it on the same lines as they used producer gas.

Mr. P. ST. G. KIRKE said that just before the war started he went over to Cockerill's work in Belgium and experimented with blast-furnace gas and a 6 in. tube 12 ft. long. After some difficulty they got an evaporation of 20 lbs. per sq. ft. of heating surface on blast-furnace gas; but it was very difficult to burn. They had to start up by putting the gas into the tubes at a very slow rate; but when it had got properly mixed—they were working with an explosive mixture—they could speed-up very much; and provided the combustion was completed before it touched the water-cooled water tube, everything went well. He believed there would be no difficulty in burning blast-furnace gas; but it would not be possible to use such a long boiler; unless the air was pre-heated. Pre-heating of the air would certainly make it much easier to burn blast-furnace gas; and when they got a chance of putting in a boiler fired with this gas, they would put an air heater of the under-feed stoker type at the exhaust end, in order to enable the boiler to be made as long as possible. With regard to the efficiency with a producer, the boiler efficiency was a little over 90 p.ct., with a feed-water heater. Unfortunately, the producer efficiency was not more than 15 to 80 p.ct., and when the two were multiplied together, the result was no better than that obtained with direct coal firing. The proposition only became interesting if the bye-products could be recovered; and this necessitated a large scheme. The boilers to which he had referred worked with an explosive mixture which back-fired; but they were not now using an explosive mixture, and it was absolutely impossible for the charge to back-fire. The difficulty was that the first part of the combustion took place by flame, and the flame was accelerated by the refractory material in the tubes. How much took place by flame and how much by surface combustion did not matter, because the same result was secured—they obtained complete combustion of the gas with a variable quantity of air. They had done a good deal of work also in connection with the recovery of waste heat, and most of it had been done with gas-engine exhaust. The gas-engines had plenty of power to drive the gases through the tube to the waste-heat boiler, which caused less back-pressure on the engine than a silencer. He had been told by some users that this was helpful to the engine, and that it silenced the engine as well as any silencer.

The CHAIRMAN (Dr. Charles Carpenter), in proposing a vote of thanks to the authors, said they had proved that if they wanted to convert heat into steam it could be done economically by the method they proposed, always assuming that the source of heat—viz., gas—could be supplied under economical conditions. One of the advantages of the boiler was that it could be switched in or out very much like a motor. It had been suggested that unless there was an independent supply of gas, and if the boiler had to be incorporated with the unit for generating gas, they were face to face with stand-by losses; but the most that could be said with regard to this was that the stand-by losses of a producer would not be anything like the stand-by losses in the case of an internally fired or Babcock boiler. In other words, they had very much greater control over the production of gas in a producer than was possible in handling the dampers of the ordinary form of boiler.

STEAM FROM LOW-GRADE FUEL.

By P. PARRISH, A.I.C.

In his paper, entitled the "Production of Steam from Low-Grade Fuel, and a Chemical Works Power Plant," Mr. Parrish said the application of a hard-and-fast rule is impossible when determining the best type of prime mover for a chemical works. The major portion of the prime mover at the works under review is required in connection with plant for: (1) Disengaging ammonia from ammoniacal liquor, which is treated in continuous columnar stills; the gaseous ammonia being absorbed in such a way as to produce liquor ammonia, ammonium sulphate, sulphite, chloride, and polysulphide. (2) Promoting the formation of sulphuric acid in the chamber process.

Approximately 1000 tons of gas liquor are treated per day, and about 75 tons of chamber acid made. Other chemical processes are conducted; but those named are the most important. The several processes involve a variety of chemical and mechanical operations, which may be briefly cited as follows: Distillation (under pressure and under vacuum), condensation, calcination, concentration, dissolution, crystallization, lixiviation in vacuum filters, filter-pressing, centrifuging, drying, grinding, disintegrating, screening, elevating, and conveying, &c. Despite these several operations, the power load is relatively small compared with the total prime mover required, and constitutes only 18 to 20 p.ct. of the aggregate load. As steam is the best medium for disengaging ammonia from ammoniacal solutions, not only from the point of view of its heat value, but also as regards its carrying effect, it would appear that the choice of a prime mover is for the most part confined to steam. The chemical works in question are immediately adjacent to the gas-works, where large quantities of coal are carbonized; and as the resultant coke has to be graded and screened, there is a quantity of coke breeze immediately at hand. At one time the disposal of this material presented difficulty; but the progressively increasing price of fuel of late years has compelled attention to its disposal.

Referring to an illustration showing details of the Crosthwaite patent forced-draught air-tubes, the author explained that coke breeze or dust obviously lies in a compact mass, presents considerable resistance, and renders uniform distribution of air at a reasonable pressure next to impossible. Though porous, there is no uniform porosity; and such pressures have to be induced by the operation of the steam blast as invariably lead to the introduction of an excess of air beyond that theoretically required for the combustion of the carbonaceous matter in the fuel. Experience suggests that the depth of the fuel bed should be about 6 in., and further that it would be an advantage if the outer primary air-ports were capable of adjustment so as to obviate the "blowing" of the fuel bed at points adjacent to the curvature of the boiler. Systematic and judicious clinkering plays an important part in securing efficient results. It is usual to clinker the fires twice each eight-hour shift; but no irrevocable rule can be imposed. Much depends on the quality of the low-grade fuel. With coke breeze high in ash and moisture content, it is necessary to clinker three times per eight-hour shift.

A Lancashire boiler which is capable of evaporating (say) 600 gallons of water per hour with best steam coal is incapable with low-grade fuel of being worked with coke breeze at a maximum thermal efficiency above a productive capacity of 400 gallons per hour. It has also been found that the grate, as occasionally installed by the forced-draught specialists, is too long to admit of maximum thermal efficiency. By reducing the length of the grate by about 20 p.ct., the temperature of the waste gases was reduced from 310° to 240° C., a less quantity of fuel was consumed, the capacity of the boilers was unimpaired, and the chimney draught was not prejudicially affected. As originally installed, the length of the grate merely led to the combustion of

extra fuel and an accession of the temperature of the waste gases —very little additional heat being transmitted to the water in the boiler, largely due to the absence of adequate surface area for heat transmission. To what extent the steam used in the blasts for inducing the supply of primary air tends to form water gas, is a matter which is at present under investigation. There are evidences that a portion of the steam so used is dissociated and forms water gas.

Attempts to increase the porosity of the fuel bed, and to admit of a better control of the air supply to the boilers, thereby reducing the possibility of the formation of drift, by using a proportion of broken coke—say, about 50 p.ct. of the total—have not been attended with the success that was anticipated. True, a more porous fuel bed is secured, and the conditions are favourable to the abatement of the drift nuisance. But unfortunately the financial results of the operation of the boiler plant suffer, as the loss due to unburnt clinker is not curtailed commensurately with the extra expenditure on fuel.

There was a diagram showing the comparative costs in pence per ton of steam produced in eight Government factories and at Phœnix Wharf (the works referred to in the paper). In the case of coal, the figures were computed on the price at which a similar quality could be bought delivered at the Phœnix Wharf; and the cost per ton of steam varied from 94·68d. to 59·22d. With coke breeze at 13s. 6d. per ton, representing the price at which it is purchased from the gas-works, the cost comes out at 46·66d. per ton of steam—thus demonstrating, as Mr. Parrish remarks, "the economy resulting from the combustion of coke breeze, when properly supervised." On the whole, he strongly favours centralization of power plant, believing that the loss incurred owing to a moderate load factor is more than counterbalanced by more economical running costs, reduced repairs, and maintenance charges, and economy in initial capital expenditure.

DISCUSSION.

Mr. J. H. WEST said he had had experience six years ago of burning coke breeze under a battery of six Lancashire boilers in a chemical works, and was able to make comparative tests with another plant of four Lancashire boilers burning bituminous slack through Underfeed stokers. The two works were making the same products. The cost of the coke breeze delivered alongside was 6s. 3d., while the coal in the other works cost 13s. 3d. For the production of a ton of steam, the fuel cost in the case of breeze was 13d., while in the case of coal it was 20·5d. The respective labour costs were 8d. and 6d. The great difficulty in the use of breeze was the choking of the side flues; the dust very often being 2 ft. thick. He adopted the system of cleaning out one fire at a time on each boiler; and this meant there was always a fire-door open. He had tried to reduce the primary air. This was not only apt to result in incomplete combustion, but it presented the risk of unburnt carbon monoxide passing into the main flue and causing explosions. The difficulty was overcome by increasing the primary air to a proper figure. It was, of course, in favour of coke breeze that it was cheap. Boilers burning breeze could not be forced to any extent if there was an emergency demand for steam. It was very difficult to get more out of them; and if they did, it was at the expense of the efficiency.

The CHAIRMAN said he imagined that the speaker's last remarks referred to the use of breeze in a Lancashire boiler. Using a Babcock or Stirling type of boiler, however, such as was commonly employed in power stations, it had been found that breeze containing a certain proportion of larger coke gave results as regards output from the boiler very nearly equal to those obtained when using coal.

Mr. H. M. RIDGE said that if the author had been using excess of steam for blowing in the primary air—and he was not at all clear that this was the case—it was a most undesirable thing, because not only did it give too much cooling, but with coke breeze a considerable proportion of water vapour which was not decomposed would pass through the incandescent coke; so that he would be losing heat at every stage.

Dr. W. R. ORMANDY asked whether the experiments were carried out on a Lancashire boiler. He would like to know whether, with vertical gas-retorts of the Glover-West type, in which steaming was employed, the water gas manufacture which took place in the lower or hot portion of the layer of coke led to the separation of ash, particularly on the outside of the coke particles, and did it result in the removal of a considerable proportion of the ash? With regard to the utilization of jets, it was essential to have a standard plug to test the size of the holes, because they very rapidly enlarged.

Mr. PARRISH, replying to the discussion, said the experiments were made on a Lancashire boiler. He had had no experience of whether steaming fuel in Glover-West retorts led to the separation of ash on the coke particles; but he should imagine that it did. His personal view about the scientific combustion of this material was that it should be burned outside Lancashire boilers in a type of producer involving three conditions—a modified type of step-grate was required, the producer must be arranged in such a way that there was preheating of the low-grade fuel, which was essential, and the step-grate should be such that the clinker could be removed almost automatically. If they could get preheating of the low-grade fuel and fairly regular removal of the clinker, he was certain that this material could be combusted to advantage, and even much more economically than the figures furnished in the paper showed.

The CHAIRMAN, in expressing the thanks of the conference to the author, said he would be the last to suggest that he had put forward a scientific process; but he had described an economical method of raising steam arising from the fact that the fuel he had was very low in price. He had really summed up the whole question in his last words, when he said that the breeze should not be burned under a Lancashire boiler at all. It should be gasified externally by a producer properly designed for the purpose, and then the gas led into a boiler of some such type as that described by Prof. Bone. This was a subject which might occupy the brains of some of the young designers. A great deal of this low-grade fuel was produced all over the country in increasing quantities, because the coke which it was now more or less the fashion to make was much more friable than the harder coke produced in the old fashioned retort-setting. He had always thought there was scope for a producer which would burn breeze; there certainly was increasing use for one to-day. With regard to the question of ash raised by Dr. Ormandy, he would like to say that the lower part of the vertical retort was at a very low temperature. It was made of cast iron, and he could not imagine there would be any difference in the ash content of the coke at its edge or extremity and in the middle. He imagined that the coke had been fairly broken-down by the time it got to the lower part of the retort; otherwise he did not think the results would have been achieved, at any rate as regards ammonia production, that had been returned from time to time in the press.

The CHAIRMAN, in bringing the conference to a close, said he was sure all those who were engaged in the chemical trade recognized the increasing importance of chemical engineering. He hoped the group would be able to bring together those whose practice was mainly engineering and those whose practice was mainly chemical. This had been done very successfully in Germany; and there was no doubt that the position which the German chemical industry was in to-day, and was in before the war, was due very largely to the completeness of the collaboration between the chemist and the engineer. This was a work which the Chemical Engineering Group had set out to perform in this country. The thanks of all those engaged in the chemical industry were due to the Chemical Engineering Group for the bold step they had taken, for the persistence with which they stuck to their point in face of a great deal of opposition, and, finally, for the success which had attended their first effort in the direction of the conference.

Prof. HINCHLEY (the Chairman of the Group), proposing a hearty vote of thanks to Dr. Carpenter, said they all appreciated the encouragement which he had from the beginning given to the movement.

THE MANUFACTURE OF INTERMEDIATES.

By E. V. EVANS, F.I.C.

At a conference on dyestuffs last Thursday, one of the papers presented was by Mr. E. V. Evans, the Chief Chemist of the South Metropolitan Gas Company, who stated that the dye user requires a much larger variety of colours and shades than those obtainable in great Britain at the present moment; and these demands cannot be satisfactorily met until the intermediates required are manufactured of a quality equal to that of the pre-war imported product, and at a reasonable cost. In fact, the lack of an adequate supply of intermediates is mainly responsible for the present state of affairs. Intermediates are not only manufactured by the British Dyes Corporation, but also by a number of other chemical undertakings; and during the last three years the author has had the opportunity of meeting at regular intervals practically all these manufacturers. They constitute a special group of the Association of British Chemical Manufacturers, and may be said to represent all British makers of coal tar intermediates and dyes outside the British Dyes Corporation. When considered individually, most of these undertakings are small compared with the British Dyes Corporation; but in the aggregate they represent an invested capital of some 25 million pounds, and, if their efforts are co-ordinated, form a body admirably suited to deal with the problems of the future. It stands to reason that, with so many industrial problems remaining unsolved, the value of such a body cannot well be ignored; and although the effort already made by the established dye manufacturers is stupendous and most praiseworthy, the national interests will best be served by utilizing to the fullest extent the whole of the resources of the chemical industry. Whatever means may eventually be adopted to develop the whole of the country's resources, consideration might advantageously be given to a few of the underlying principles practised by Germany to protect its chemical industry. In many instances may be seen the effect of co-ordination in the German chemical industry, and it should be emphasized that the industry is self-controlled by a highly technical directorate of chemical manufacturers.

In the manufacture of the intermediates still required in this country, processes of a certain degree of complexity are entailed. Moreover, of these many are required in small quantity. It is therefore impossible to imagine that the manufacture of these new intermediates, conducted in a number of small units distributed throughout the kingdom, will lead to success. In such cases, in order to pay due regard to the importance of mass production, manufacture must be undertaken only by one or two makers possessing special facilities; for it is no simple matter to displace imported manufactures at the present moment—even with installations of large output—owing to the existing cost of plant and apparatus, and the high prices of labour and fuel. While on the one hand great attention must be paid to mass production, it is in the natural order of things that the manufacture of intermediates should not be concentrated in one or two centres, but should be distributed in order to take full advantage of the present resources of the chemical industry. This distribution should be decided by such factors as geographical position, the cost of fuel, of transport, and of labour, and the present fitness of the manufacturer to undertake the work in question. But when the decision is made, plant of considerable output should be installed.

A great co-ordination of effort is required; and the industry seeks leadership by those who are convinced that there exists such potentiality among the chemical manufacturers who made muni-

tions and poison gases that in the utilization of their services, which they are willing and anxious to give, lie the means to success. Chemical manufacturers have submitted themselves to four years of Government control; and though this is not suggested as a means of dealing with the dye problem, it is believed that the chemical manufacturer is in the frame of mind to welcome internal control in the industry.

DISCUSSION.

The CHAIRMAN (Dr. Rée) said that the author had had an exceptional opportunity during the last month or two of realizing the conditions that obtained particularly in the large German colour factories. Mr. Evans had also done a great deal of excellent work during the past three or four years in connection with the Association of British Chemical Manufacturers, and more particularly with the group which dealt with dyestuffs and intermediates; and something at all events had been accomplished in the direction of co-operation and co-ordination which he thought they all felt was very necessary in the interests of the industry.

Prof. A. G. GREEN said he did not know that he had entirely followed the author's argument; but if he advocated complete separation, or anything like complete separation, of intermediate manufacture from dyestuff manufacture, he could not agree with him.

Mr. F. H. CARR said that anyone coming home from that wonderful centre of distribution, the Rhine, could not help seeing the enormous advantages to the German chemical industries that the Rhine had, because it brought each unit of the concern into immediate proximity with the other, even though they might be 20 or 30 miles apart.

Mr. ARTHUR GREEN, who said he had been with Mr. Evans during his recent visit to the German chemical factories, remarked that from what he knew of Mr. Evans's position with regard to this matter, he did not think he would claim that in all cases intermediate manufacture should be separate from dye manufacture. In Germany, the secret of success was that the whole of the processes in the works of the large combines were carried out at one centre. If they were going to distribute the manufacture of these intermediates over the whole of the United Kingdom, it would necessarily mean that the cost of manufacture would be greater than if the dyestuff maker manufactured them for himself.

Dr. J. C. CAIN thought Mr. Evans's idea was that certain intermediates should be made in the dye manufacturing works and certain others in separate works.

Prof. H. E. ARMSTRONG said he gathered from the last paragraph in the paper that the great lesson which the author had learned on the Rhine was that the industry must get together and organize. The development of the chemical industry in Germany commercialized and ruined the majority of the German laboratories, by making it clear to them that it was desirable to make money out of chemistry. It spoiled them as educational centres. They used to communicate one to the other what they learned, and taught one another. Then the staff was subsidized by the manufacturers; and instead of the students being free to talk about their work, they were put under a pledge of secrecy not to say a word about it. This had a most serious influence. He did not want to see this condition introduced here; but it was being introduced, because the Government were giving grants on condition that reports of the work should not be published without consulting them. Nothing worse could be imagined as an influence; and the Society ought to set itself to appreciate the danger we were running. There was a lot of ability in the country; but it had not been directed to the chemical industry, and it would not be under present conditions any more than it had been in the past.

Mr. EVANS, in reply to the discussion, said he would not deal in detail with any of the questions that had been raised, because he was not capable of doing so. What he had to tell them was that he had been to Germany, and had seen the best organization, ready to send their material over here at the earliest opportunity.

South Suburban Gas Company's New Superannuation Scheme.

For many years past there have been in operation two schemes with the object of providing superannuation allowances to the officers and workmen of the South Suburban Gas Company. One of the earliest duties placed by the Directors of the Company upon the Co-Partnership Works Committee formed a few months ago [see "JOURNAL" Jan. 7 last, p. 31] was an investigation into the whole question of superannuation, to see how far it was possible to merge the two schemes into one, with a basis of contributions and benefits common to all co-partners in the service of the Company. A small Sub-Committee was formed to deal with the matter, consisting of the Secretary of the Company (Mr. Wilfrid Wastell), the Secretary of the Co-Partnership Committee (Mr. John Baker), the Chairman of the Works Committee (Mr. T. Ansett), and the Secretary of the Works Committee (Mr. C. J. Carter); and progress was reported to the Directors from time to time. As a result, a complete scheme to apply to all co-partners in the Company's service has been approved by the Board; and the scheme was submitted to sectional meetings of the employees on the 11th and the 14th inst. Two meetings were held in the Livesey Memorial Hall, at Lower Sydenham, one at the Bromley works, and one at the Dartford works, at all of which the Chairman of the Company (Mr. Charles Hunt) presided—the scheme being explained by the Secretary of the Works Committee. A vote taken at all the meetings was practically unanimous in favour of the adoption of the scheme. A novel and important feature of the new scheme is the inclusion of provision for the payment of superannuation allowances to the widows of members of the fund.

The annual meeting of the Irish Association of Gas Managers is fixed for Aug. 19, in Dublin.

A PORTABLE CUBIC-FOOT STANDARD FOR GAS.

By M. H. STILLMAN, Assistant, American Bureau of Standards Department, Washington.

ONE of the recent publications of the Department of Commerce of the Washington Bureau of Standards is a description of a portable cubic-foot standard for gas—the subject of an American patent, No. 1,234,505, granted to Mr. Stillman on July 24, 1917.

In his descriptive pamphlet under notice, Mr. Stillman points out that this new type of volume standard for measuring gas has been found to possess decided advantages as a cubic-foot standard over apparatus of this class in use at the present time. While the portability, accuracy, and ease of operation of the new device adapt it especially to the class of work in which an inspector is required to make gas-meter testings over a comparatively large territory, it has also been successfully used for other purposes in which the delivery of a comparatively small volume of gas with a high degree of accuracy was required.

The author proceeds to give a detailed description of the standard. The illustrations consist of a vertical cross section (fig. 1) through the cubic-foot bottle apparatus, which is about 25 in. high overall, and a horizontal cross section (fig. 2). The first illustration shows that there are two coaxial cylinders (with an annular space between them) closed by a base plate. In this way an annular tank is formed, in which the bell A (closed at the top) may be moved up and down, guided by sliding mechanism at the axis of the apparatus. The inner cylinder or core is also closed at the bottom. The clearance space between the sides of the core and the bell is made as small as is consistent with freedom of motion, in order to minimize the changes in the volume of the sealing liquid within the space due to changes in the gas pressure within the bell. This results in rendering negligible the errors due to the small pressure changes that ordinarily occur.

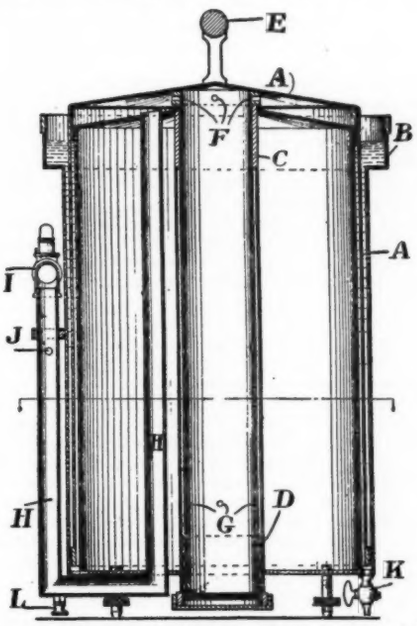


Fig. 1.—Vertical Cross Section through the Cubic Foot Bottle Apparatus.

The diameter of the top of the outer cylinder is enlarged so as to form a reservoir, B, of such capacity that the raising and lowering of the bell will not cause any excessive change in the height of the sealing liquid.

The guiding mechanism referred to above consists, primarily, of two telescoping tubes. The inner one is securely fastened to the inside of the top of the bell, and consequently as it is raised and lowered it slides up and down within the stationary tube which is secured gas-tight to the core and the base plate.

The interior of the upper end of the outside guide tube is provided with a thickened portion or ring C, of such thickness as to closely fit around the inside tube. The exterior of the lower end of the tube is provided with a screw-thread, to which is attached by means of a handle a ring or collar D, of such thickness as to fit closely the inside surface of the outside tube. There is thus provided for the bell guiding mechanism permitting very little lateral motion. It is evident that when the bell is raised by means of the handle E, the upward motion will be limited by the collar coming in contact with the shoulder formed by the ring C. It is also evident that the height to which the bell can be raised may be regulated by screwing the collar D up or down upon the inner tube. This collar, when adjusted, is fixed to the inside tube by means of a set-screw. The lowest portion of the bell is established by the collar fastened to the bell; the inner guide tube coming in contact with the upper end of the outer stationary guide tube and its attached collar.

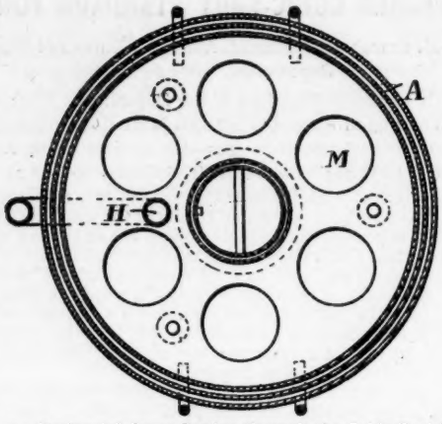


Fig. 2.—Horizontal Cross Section through the Cubic Foot Bottle Apparatus.

The wall of the lower end of the outside tube is thickened, and provided with an external screw-thread, to which is screwed a cap making with it a gas-tight joint. In order to connect the interior of this guiding mechanism with the interior of the bell, two sets of holes F G are provided.

To connect the interior of the bell with the free air or with any volume of gas, the tube H passes gas-tight through the top of the core, down through the bottom plate, and up to the valves I, which may advantageously be replaced by one three-way valve. To the opening J, a manometer or other pressure-measuring device may be connected.

A stop-cock K is attached to the bottom of the annular tank, in order to provide means of removing the sealing liquid which normally fills the tank up to approximately the height shown in fig. 1.

The gas conductor H is provided with a drain cock L, which is used to remove any sealing or other liquid which may accidentally enter the conductor. A number of large holes M (fig. 2) are formed in the bottom plate, so as to not only decrease the weight of the apparatus, but to allow the air of the room to get within the core, and thus more quickly equalize the temperatures of the apparatus and the room.

While the instruments so far constructed have been either of brass or copper, aluminium could well have been utilized to a very large extent, and the weight thereby materially reduced. Only a little more than a gallon of the sealing liquid is required by each instrument.

Operation.

Briefly stated, the method of operation is as follows: The annular tank is first filled with water, or preferably an oil of small vapour pressure and small viscosity. The raising of the bell A to its upper limit by means of the handle E draws into the interior of the bell, through the valve I and tube H, a definite volume of gas. The extent of the volume depends for a given apparatus upon the distance the bell can be raised, which is the distance between the stops C D. If the bell is then lowered to its initial position, it is obvious that the same definite volume of gas will be expelled. The method of calibrating and adjusting the apparatus to deliver a cubic foot with the required accuracy will be described later; for the present it will be assumed that this adjustment has been made.

1. Calibration of Provers.—The manner of using the apparatus to calibrate meter-provers is so simple that those who have used the ordinary cubic-foot bottles would be able to use it successfully without further explanation. Use of the apparatus has, however, indicated certain details which should be observed if all the advantages inherent in this form of standard are to be realized. In order to aid in the discussion of these the following outline of procedure, which has been successfully used, is given:

1. Open one of the valves I to the air of the room, and fill the annular tank with sealing liquid (preferably a proper oil) up to within about an inch of the top of the tank.
2. Connect one of the outlets I to the prover by means of a rubber tube.
3. Open all the valves between the prover and the cubic-foot apparatus.
4. Test the apparatus and connections for leaks.
5. Make the necessary temperature adjustments.
6. Fill the prover with air at normal prover pressure (usually 1½ in. of water), and adjust so that the reading is zero.
7. Raise the bell of the standard from the lowest position to the highest position—thereby withdrawing 1 cubic foot of air from the prover. Read the prover, and record the reading. [It will be necessary to keep a hand on the handle of the bell in order to maintain it in its highest position while taking this reading.]
8. Reintroduce into the prover the cubic foot of air from the standard by pushing the bell down to its lowest position. Again make and record the prover reading. Operations 7 and 8 effect two determinations of the interval 0-1 of the prover. Repeat these operations a sufficient number of times to determine the true volume of the interval 0-1 with the required accuracy.
9. With the bell of the cubic-foot apparatus in the lowest position, allow 1 cubic foot of air to escape from the prover into the room, and calibrate the next interval 1-2 of the prover in exactly the same manner as the interval 0-1 was calibrated.
10. Calibrate the other intervals in the same manner.

As is generally true when accurate comparisons of volume are to be made with air or gas as the medium of comparison, care must be taken to make proper allowance for differences in temperature and vapour content of the air in the standard and prover. Generally, the most satisfactory and practicable procedure is to have the temperature of all parts of the system involved in the comparison practically the same. If, as is advocated, a suitable oil is used as a sealing liquid in the standard, changes of temperature due to evaporation from the outside of the bell are practically zero. Also, because of the construction of the standard and the small amount of sealing liquid required by it, the temperature of the standard will be maintained at very nearly that of the room, unless the room temperature varies rapidly. The advantages of this are evident. If, as advised under No. 6 of the above outline of procedure, the test is started with the bell of the prover full of air, the bell should remain in its highest position for some time before the test is started—allowing its surface to become dry and its interior to become saturated with water vapour (assuming that water is being used as a sealing liquid in the prover). By so doing, the test may be conducted with practically a dry bell—the maximum wetted surface exposed to the air of the room at any time being that corresponding to 1 cubic foot of its volume; the average exposed wetted surface being only about one-half of this maximum.

In order to ensure that the air in the prover and the cubic-foot apparatus is thoroughly mixed and saturated with water vapour, it is well to transfer a quantity of air back and forth between the prover and the standard a number of times, by raising and lowering the bell of the standard.

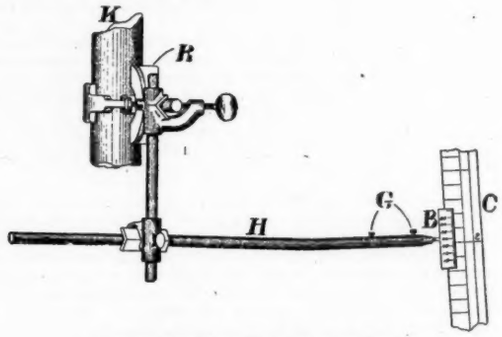


Fig. 3.—Auxiliary Meter-Prover Scale.

A good indication that the conditions are satisfactory for the commencement of the test is obtained by first noting the reading of the prover, and then after interchanging air between the standard and the prover a few times noting the reading again. If the reading of the prover has not changed appreciably, it may be safely assumed that no serious leak exists, and that the conditions of the air in the prover and the standard are, at least, temporarily stable.

It is very desirable to test the prover with the same air-pressure in the bell and the same quantity of sealing liquid in the tank as obtain while the prover is being used to test meters. If this is not done, it is evident that the portion of the prover bell corresponding to a given interval on the scale while the prover is being tested will, in general, not be identical with the portion corresponding to the same interval while the prover is being used to test meters.* The cubic-foot standard under discussion is unusually well adapted to take advantage of this fact, since its operation at ordinary prover pressures is just the same as it is at atmospheric pressure.

In operating the standard, care must be taken not to raise or lower the bell too quickly. If it is raised too quickly, the air pressure inside the bell may be so much reduced that the sealing liquid will be drawn up over the core and into the gas conductor, or if at the commencement of the down-stroke the bell is pushed down too rapidly, it will force the air out from the bottom of the bell. Of course, by increasing the size of the gas conductor or making it extend higher inside the bell, the speed of the operation of the instrument may be greatly increased; but it has been found that even with the proportions shown in the illustration the apparatus may be easily and successfully operated considerably faster than the ordinary cubic-foot bottle.

There is given below a copy of the data sheet of the calibration of a 5 c.ft. prover by the new standard. The prover bell was of painted sheet iron, and was protected from the direct action of the air of the room by a stationary metal cover, which

* If the prover bell were of absolutely uniform diameter throughout the portion of its length exposed to the sealing liquid, this would be unimportant. But since variations do frequently occur in manufacture and through accidental denting, it is very desirable to adopt a method of test that will avoid incorrect results due to such variations.

was supported upon the rim of the prover tank. The sealing liquid used in both prover and cubic-foot standard was a thin oil which has been found very satisfactory.* The table shows the close agreement of successive determinations of the same interval that may be expected when proper precautions are taken. When water is used as the sealing liquid and the unsaturated air of the room is allowed to circulate freely about the bell of the prover, the results will be less accurate and the variations of successive determinations will be greater.

DATA OF CALIBRATION OF FIVE-CUBIC FOOT METER PROVER.

Interval on Prover in Cubic Feet.	Reading of Prover Scale.		Volume of Discharge Indicated by Prover.	Actual Discharge for 1 C.Ft. Indicated by Prover.
	Before Discharge.	After Discharge.		
			Cubic Feet.	Cubic Feet.
	0·000	0 998	0·998	..
	·000	·997	·997	..
0-1 (1.30 p.m.) . . .	·000	·9975	·9975	..
Mean			·9975	1 002
	1·000	1·997	·997	..
	·999	1·996	·997	..
1-2	·999	1·996	·997	..
Mean			·997	1·003
	2·000	3·000	1·000	..
	2·000	3·000	1·000	..
2-3	1·999	2·999	1·000	..
Mean			1·000	1·000
	2·998	3·996	·998	..
	2·998	3·996	·998	..
3-4	2·998	3·996	·998	..
Mean			·998	1·002
	4·000	4·993	·993	..
	4·000	4·993	·993	..
4-5 (2.10 p.m.) . . .	4·000	4·9925	·9925	..
Mean			·9928	1·007

NOTE.—During the test—*i.e.*, from 1.30 to 2.10 p.m.—the temperature of the cubic-foot standard and of the prover rose from 21·5° to 21·9° C., and that of the air of the room from 22·0° to 22·1° C.

Practically all the methods of calibrating a prover at present in use (including that just described) involve the introduction into or withdrawal from the prover of a whole cubic foot of air; the only scale-reading being that of the prover. As is well known, it is not always easy to read these scales accurately—say to one one-thousandth cubic foot—because of the length of the smallest interval (sometimes one-tenth of a cubic foot) and also because of the considerable width of the division marks. Some provers are provided with verniers, by means of which the scales may be read to one one-thousandth of a cubic foot; but this is not common.

In order to avoid errors in reading due to the width of the graduations, the writer has found that the practice of reading either the top edges of all of the graduations of a given scale or the bottom edges of all the graduations is effective if the edges are straight and clearly defined.

This scale makes it practicable to read the ordinary 5 cubic foot prover to a degree of accuracy of one one-thousandth foot, which is commensurate with the constancy of volume of gas in the prover bell that it is practicable to maintain for a short time under good laboratory conditions.

ADJUSTMENT OF THE CUBIC-FOOT STANDARD.

The adjustment of the new cubic foot standard to take in and deliver 1 cubic foot of air or other gas with a high degree of accuracy is easily made by making use of a carefully calibrated cubic-foot bottle.

The method consists of so adjusting the capacity of the new standard that, upon discharging into it 1 cubic foot of air from the standardized cubic-foot bottle, no change of pressure in the new standard takes place. As is evident from the description of the apparatus, the capacity of the standard is increased or decreased by screwing the adjustable guide and the stop D down or up.

The apparatus is well adapted to being officially adjusted and sealed. Sealing is accomplished either by sealing the adjustable lower guide D to the inner guide tube—thus preventing relative motion between the two, or by sealing the cap on the lower end of the outer guide tube in such a way that it cannot be removed without breaking the seal. Moreover, with the bell in its lowest position, which it normally occupies except when a test is being made, it is almost completely protected from accidental injury.

ADVANTAGES OF THE NEW STANDARD.

Use of the cubic-foot standard as described has shown it to be practicable and to possess to a marked degree the following advantages:

1. *Portability.*—The apparatus is so compact and light that it can be carried about by one man. By providing it with a case, it can safely be sent as baggage or shipped by express.

2. *Accuracy.*—While in itself the apparatus is not more accurate than the regulation cubic-foot bottle commonly in use, yet it is believed that with the ordinary care it is practicable to exercise in routine prover-testing, the new apparatus will generally give more accurate results than the former, because: (1) It is practicable to use oil as a sealing liquid, since the small amount (little more than a gallon) can be easily carried with the apparatus or be kept at each prover station. The oil does not evaporate from the surface of the bell to an appreciable extent, and so introduce errors due to cooling and change of vapour pressure within the bell. (2) As explained, it is very convenient to test the prover under the same conditions as regards pressure in the prover bell and quantity of sealing liquid in the tank as obtain during routine meter testing. (3) The transfer of air between prover and standard is accomplished very quickly—thus reducing variations in temperature and vapour pressure within the prover and standard during the test of a given interval.

3. *Convenience and Rapidity.*—Setting-up the new standard for a test consists simply in removing it from the case and pouring the necessary quantity of oil (or other sealing liquid) into the tank. This requires only a few moments. After completing the test of one prover, the standard may be easily moved to the next by one man without removing the sealing liquid. The operation of calibration itself is rapid—considerably faster than is practicable with the ordinary cubic-foot bottle.

* The oil used as a sealing liquid has the following physical characteristics: Flash point, 65° C.; fire point, 90° C.; viscosity, 46 seconds at 100° Fahr. (Saybolt scale).

IMPORTANCE OF THE LOAD FACTOR.

The vital importance to all gas undertakings of the load factor is emphasized by Mr. Thomson King (the Superintendent of Fuel Sales of the Consolidated Gas, Electric Light, and Power Company of Baltimore), in an article published in the "American Gas Engineering Journal." Each concern, he says, should make a careful survey of the business within its reach, taking into most careful account the effect of each class of this business on its load characteristics of the future. The size of the gas generating plant can be determined by the maximum day's, rather than by the maximum hour's, output. This is true until the holder is reached. The size of the holder is determined by the maximum output into the distribution system, the size of the mains by the maximum demand of the territory each serves, and the size of the services and meters by the maximum demand of the individual installations they serve. The gas-making plant represents only about one-third of the investment necessary to make and distribute gas in most cities; so that the greater part of the total investment is affected by the maximum hourly demand. Many of the running charges are determined by the number of customers, and not by what they use. For instance, meter reading, accounting, complaint, and general charges are about the same, whether a customer uses much or little gas. On the other hand, the revenue under a flat system of rates is proportional to the average output, while the cost of gas delivered to the customer is largely determined by the maximum demand, and a nearly constant consumer charge. Thus the ratio between the maximum and average output and the consumption per customer are of vital importance. Indeed, they will probably be the determining factors in deciding whether there is a profit or a loss on a business. Considering the new business that may be obtained in the future, he says laundry work is non-peak business, and very acceptable. Water heating is business of the widest diversity factor, and hence should be cultivated and fostered to the fullest extent. The commercial and industrial field is, however, from this point of view, the richest one open to a gas undertaking. It offers the greatest opportunity for off-peak business.

Measuring the Zones in a Gas-Producer.—Mr. J. S. M'Climon, of the Wellman-Seaver-Morgan Company, of Cleveland, U.S.A., states that, in order to ensure satisfactory operation, the three zones of a gas-producer should remain constantly in the same proportion; otherwise the amount of gas given off will vary in quantity and quality. These three zones are: (1) The ash zone; (2) the incandescent or fire zone; and (3) the green coal or distillation zone. He suggests a method which he claims will accurately determine the proportions. A ¾-in gas-pipe is marked into 2-ft. sections by rivets running through the pipe; and a mark is placed at the height equal to the distance between the blower and the producer top, to indicate the distance the rod should be forced into the producer. When using the rod, the distance to the top of the fuel-bed is first determined. Then the rod is forced through the fuel-bed until the lower end is on a level with the top of the blower. After about three minutes, the rod is withdrawn and on it will show distinctly two parts—one a smoky black portion extending for several feet, and the other a red portion usually from 12 to 14 in. long representing the incandescent zone. Below this should be a portion not affected by the heat, representing the ash zone; and it should never be less than 6 in. nor over 15 in. Above the highest point of the red portion will be a space of from 6 to 12 in. representing the green-coal zone.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas Consumers and Research by Individual Gas Undertakings.

Sir,—The description of the visit the Southern Association of Gas Engineers and Managers made to the works of the South Metropolitan Gas Company, which appeared in your issue of July 8, together with the leading article thereon, must have been of extreme interest to those who have the future prosperity of the gas industry at heart.

The Company is to be congratulated upon developing, with its large financial resources, the research section of its works to such a degree in a desire to improve existing conditions; and many engineers will no doubt feel not a little envious. But research costs money, as no doubt the consumers of the Company's gas will agree; and the results of this expenditure, whether they be failures or successes, will be paid for more or less over and over again by the consumers of other undertakings who also have their research laboratories, through the multiplying of similar lines of research.

The primary object of a gas undertaking is to supply gas—thus performing a public service; and the public should not be required to pay for the failures and successes of research more than once. Neither should this Company's consumers be thus penalized when those of other undertakings, not possessing research laboratories, are not.

In the interests of the public and the gas industry itself, one central station equipped complete with the latest appliances, and staffed by experts of known abilities, should be provided at the expense of all gas undertakings in proportion to their sale of gas; and the results of research thus obtained, whether they be successes or failures, should be circulated for the benefit of all.

Thus the consumers of one gas company would not be unduly penalized; and the consumers of a small undertaking would obtain benefits which would not otherwise have been possible.

Douglas Rider.

July 15, 1919.

Current Difficulties of Small Works.

Sir,—The latest proposed rise of 6s. per ton on coal, though not unexpected by those who have studied the report of the Royal Commission, has none the less come as a bombshell to those in charge of small works, especially those situated in towns with a stationary or decreasing population.

To a plain man, the proceedings of the Court or Commission read like a scene from "Alice in Wonderland," and one rubs ones eyes and wonders if the country is in the future to be governed by men of the description of those who figured in the Court. I do not, however, write to criticize what took place there, but to draw the attention of those responsible for the management of the smaller companies to the most serious position in which they are placed by the menace of the Government electrical scheme, the proposed eight-hour day, and the prospective increase in the cost of coal, and to ask: Has not the time come when the whole system of gas manufacture must be altered, or, if not, can we continue to exist under present conditions?

I have, unfortunately, had considerable experience with small concerns, and my experience teaches me that they have for many years supplied gas at under cost price—they have been driven to cut their prices by the force of comparison—and though many have paid a good dividend, they have not earned it, and to maintain their selling price, high though it seemed to be, was only possible by low wages and the low price of coal. On the other hand, the men, judged by the larger concerns, have not been worked hard, and the amount produced has been very low. Now all this is being changed, wages appear to have no relationship to work done, coal and materials are rapidly approaching prohibitive prices, and output per man is decreasing. Very few of the smaller concerns have reserve funds, and not many have been able to keep up their repairs to a proper standard.

It is perfectly evident that the cost of manufacture cannot be decreased to any appreciable extent under the present system. Steaming horizontals and an auxiliary water-gas plant are mere palliatives in view of this 6s. rise and the possibility of the universal 8-hour day.

In a town using between 6 and 7 million c.ft. of gas per annum, three men must be employed in an ordinary way, and a retort-setting must be worked 24 hours a day. Under the eight-hour system this means seven days a week for each man. If works of this size are to be exempted from the operation of the Act, is it possible to get men to work 10 hours a day for a gas-works when their mates in other trades are working 8 hours a day, and in some cases not at all on Saturday? I think not. This means, then, that another man will have to be employed, costing at least £2 8s. per week, or 5d. per 1000 c.ft. This, with 6s. per ton on coal, will represent at least 1s. per 1000 c.ft. on present prices, which, on an average, would rule at certainly 7s. per 1000 c.ft., bringing the price up to over 8s. per 1000 c.ft. Added to this, one finds that the men who used to light and extinguish the public lamps as part of their day's work, now refuse to do so; and last winter it cost more per lamp to light and extinguish twenty street-lamps than we at one time used to charge for the whole service.

Taking all things together, it appears to me, if we are to continue to exist, we must reduce labour and the cost of coal. The former, under the present system of manufacture, cannot be done, nor can the latter. No auxiliary water-gas plant can materially assist the former, though it can reduce the cost of coal; but in my opinion the output in works of 6 and 7 million c.ft. is too small to make it worth while to run both.

We are therefore brought to the conclusion that, if we are to sell gas in the future, we must either link-up with a larger works or supply some form of water gas. As the price of pipes and labour is so excessive, and the geographical position renders the former impossible in many cases, one is forced to the conclusion that the supply of a gas of 400 to 450 B.Th.U., as recommended by the Board of Trade Commission, is our only salvation. But this plant, to be of use, must make a gas of this quality without a lot of oil enrichment, and without complications, and, further, all gas must be made in a few hours a day—thus dispensing with any night shifts.

Here, again, we are met with a difficulty. In the report of the South Suburban Gas Company, Dr. Lessing suggests that, in the distribution of water gas, the carbon monoxide content might have serious chemical action on the distributing system, though the Board of Trade Commission did not hint at this difficulty. Is there such a plant in the market as suggested? Has such a gas been produced and sold? If so, does the necessary alteration of the consumers' appliances present much difficulty; and has any authorized company adopted this process entirely?

Let there be no mistake, it is necessary for the smaller companies to exist; for if they go under, the confidence in larger concerns will be shaken. It appears to me that, purely as a matter of self preservation, the gas industry, as represented by the Institution of Gas Engineers, should appoint a Committee to report on the matter, with special reference to small works, and try to come to some definite decision as to the most suitable quality gas, and the most economical and suitable plant to produce it.

Those in charge of the smaller undertakings would have something then to place before the owners of the many struggling concerns scattered over the country. Of course, some would say: "Put up your prices to meet present day conditions." I suppose gas could be sold at 10s. per 1000 c.ft.; but how much? And with oil going down in price, and the Government booming electricity, how long for?

There is little time left. Things are moving faster every day; and I appeal to members of the profession in larger towns to give us their assistance and advice. At the end of a very trying four years, we smaller concerns are not in a position individually to apply for an alteration in our Acts of Parliament alone. Their reserve funds, if any, are depleted, repairs have been cut down to a minimum, and now the inevitable time has come when they must be effected, and the price has to be paid with more than Shylock's interest.

The future lies before us, What has it in store? If we do not change our carbonizing methods, I think there can be only one reply—extinction.

William Methven.

Bungay, July 18, 1919.

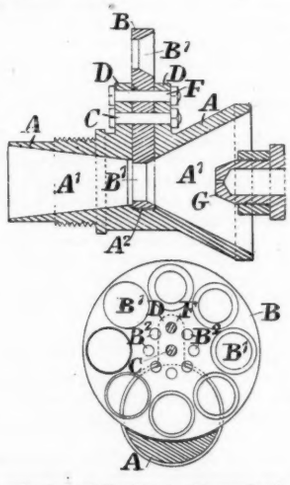
REGISTER OF PATENTS.

Atmospheric Gas-Burners.—No. 126,412.

Sharp and Preston, Ltd., and Docking, A., of Dublin.

No. 3886; March 6, 1918.

This invention relates to gas and air injector jets for supplying a gaseous mixture to burners for heating furnaces, ovens, &c.; and its object is "to provide more perfect means for regulating the admission of air, and thus obtaining a correct mixture with varying conditions of gas pressure, quality, and supply."



Sharp & Preston's and Docking's Atmospheric Gas-Burner.

In the preferred construction, the air induction tube A is formed with an opening at A^2 where the constriction in the passage A^1 is situated. This opening is so shaped as to admit the periphery of a circular disc B, mounted on a pivot C, disposed parallel to the axis of the tube A. As shown, the disc is pivoted between two lugs D on the exterior of the tube A. The outer part of the disc (intersecting the passage A^1) is provided with a series of openings B^1 disposed in a circle concentric with its pivot, so that, by moving the disc round, each of the openings will register with the passage A^1 in the tube A. The openings are of varying sizes, and so the area of the passage A^1 at A^2 can be changed at will, to suit the varying conditions met with.

The disc is made of such thickness that the openings can be countersunk or made cone-shaped at the front—thus forming an unbroken continuation of the passage A^1 at the fore end of the tube. This obviates the formation of a shoulder at this point, against which the gas from the jet G could strike.

The advantage claimed for this arrangement is that the constricted part of the passage A^1 in the tube A (whatever its size) is always circular and concentric with the gas-jet G; while the gas supply from the latter

is always directed straight through it. Thus the injector action is as efficient when the passage is reduced for (say) low-quality gas, or low pressure, as it is when opened out to its fullest extent.

Automatically Operating Gas-Valves and the Like. No. 127,368.

GRAY, J.; a communication from the Warren Clock Company, of Ashland, Mass., U.S.A.

No. 7045; April 26, 1918.

This invention relates to apparatus for performing work of short duration at predetermined times—such as automatically operating electric switches, gas and water valves, and the like. To this end, a movable time-element actuates the mechanical motor to store up energy therein, controls the action of the mechanical motor upon the movable device, and is driven by an electric motor with which it has a definite time-relation.

The invention is shown as embodied in a time-switch for electric current; but it is equally applicable for controlling gas, water, or other fluids, or for any purpose where sudden movement is required at certain predetermined intervals.

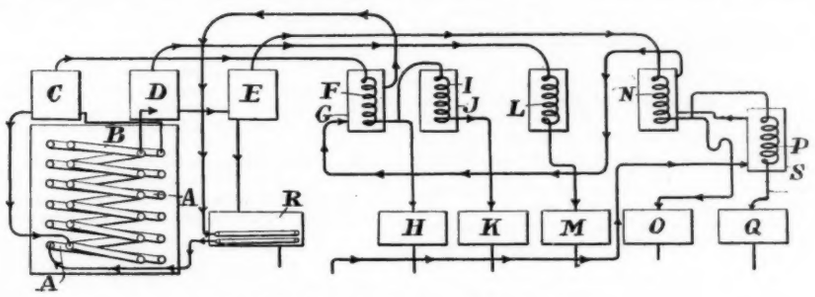
Tar Dehydration and Distillation Plant.—No. 127,700.

WILTON, T. O., of Hendon, N.W.

No. 8813; May 28, 1918.

The tar to be dehydrated and distilled is subjected in succession to a plurality of steps, each step comprising heating it under pressure supplied by pumps in a coil and suddenly releasing the pressure in an expansion chamber to liberate constituents volatile at the temperature of the expansion chamber; the tar from the first step passing on through the coil and expansion chamber of the second step for the volatilization and liberation of a succeeding fraction of its constituents, and so for any required number of steps. "For the dehydration and distillation of coal tar, two such steps of heating under pressure and releasing from pressure may suffice—followed, if desired, by the distillation of the remaining residue with steam (to remove anthracene) and leaving the pitch for collection."

The accompanying diagram shows apparatus suggested for carrying out the invention for the distillation of coal tar. A B are concentric coils arranged to be heated to different temperatures—A being heated to a lower temperature than B. Coil A is connected to an expansion chamber C, and coil B to an expansion chamber D. The latter is connected to a steam heater E. The chamber C is connected to the coil F of the first condenser G for the water and light oils liberated in the chamber C; the coil being connected to a collecting vessel H, for light oil, and to the coil I of a second condenser for collecting naphtha in a vessel K. The expansion chamber D is connected to the coil L of a creosote condenser connected with a collecting vessel M. The vessel E is connected to the coil N of an anthracene condenser connected to the vessel O and to the coil P of a second creosote condenser attached to a second creosote collecting vessel Q. R is a pitch cooler connected to the vessel E, and containing a coil.



Wilton's Tar Dehydration and Distillation Plant.

The tar to be dehydrated and distilled is pumped to the second creosote condenser, where it is used as a means of condensing and itself becomes heated; thence to the casing of the anthracene condenser, where it acts in a similar manner; and thence to the water and light oil condenser G. Similarly, from this, it passes, under pressure supplied by a pump delivering at 50 lbs. per sq. in., to the coil in the pitch cooler, where it is superheated; and thence to the heating coil A, entering this at from 30 to 50 lbs. per sq. in. pressure—the coil being maintained by heat regulation at a temperature of 160° to 190° C. (about 170° C.), according to pressure used. Thus when the heated tar enters the expansion chamber C, through a spring relief valve, the release of pressure causes the light oils and water to volatilize—the vapours passing to the coil F, and thence to the light oil collecting vessel. The uncondensed naphtha vapours pass on to the coil I for condensation and collection in the naphtha collecting vessel K.

The liquid tar from the expansion chamber C passes, by a pump delivering at 30 to 50 lbs. pressure, to the heating coil B, which it enters at about 30 to 50 lbs. per sq. in. pressure; the coil being maintained at a temperature of (say) 230° to 300° C., according to the pressure used to obtain the volatilization of creosote or like vapours whenever the tar is released into the expansion chamber D. These vapours pass to the coil L for condensation and collection in the first creosote vessel M. The tar from the chamber D passes to the separating vessel E (where steam is bubbled through it) to separate the anthracene and second creosote. These vapours pass to the coil N, the condensate from which passes to the anthracene vessel O; while the second creosote vapours pass on to the coil P for condensation, and finally to the collecting vessel Q.

Treatment and Production of Hydrocarbons. No. 128,255.

FORWOOD, G. F., of Mark Lane Buildings, E.C., and TAPLAY, J. G., of Streatham, S.W.

No. 9598; July 3, 1917.

This invention relates to the treatment of hydrocarbons of high boiling points for the purpose of converting them into hydrocarbons of lower boiling points and high hydrogen saturation; and the treatment or process is stated by the patentees to be "of that type in which hydrocarbon oils are vapourized and mixed with water vapour and passed over hot carbon."

According to their invention, the vapours of hydrocarbon oils and steam (in excess of the oil vapour) are passed over carbonaceous shale which remains after the volatile portions have been wholly or partially driven off the oil-bearing shale. The quantity of steam employed depends upon the amount of moisture held by the shale at the time of distillation—the greater the moisture in the shale, the less the excess of steam supplied from a boiler. The spent shale is heated to a temperature varying from 450° to 600° C., "as found most suitable for the particular oil to be treated;" and the oil is hydrogenated, or cracked and hydrogenated simultaneously—producing a more highly saturated oil, having in most cases a lower boiling point. The duration of the treatment depends upon the temperature, employed and the rate of the passage of the shale through the retort. The process of distillation and cracking and hydrogenating may be combined. Thus a vertical retort may have the shale fed in at the top and the refuse removed from the bottom—the vapour being brought down through the refuse, instead of passing up as in Scotch practice. The lower end of the retort is then kept at about 600° C., while the top is just hot enough (about 400° C.) to liberate the oil vaponr. Steam is then admitted either at the top, so as to pass through the fresh and distilling shale to carry off the vapour, or it is admitted lower, so that the mixed vapours pass down through the hot spent shale, which is mixed with finely-divided carbon.

Thus by this invention the patentees claim to distil the shale, crack the produced shale oil, and hydrogenate it as follows: (1) Distillation of the shale at the top of the retort. (2) Cracking of the shale oil lower down the retort. (3) Hydrogenation of the cracked shale oil at the lower end of the retort, by saturating it with hydrogen produced by the decomposition of the steam admitted by means of the carbon in the spent shale. And, further, they cause the cracking (or disassociation) of the oil in the presence of steam and the carbon of the spent shale and use the hydrogen produced by the decomposition of the steam in the hydrogenation of the cracked oil.

In carrying out their method of procedure in simple hydrogenation, a retort, either horizontal, vertical, or inclined, is filled with spent shale, which is heated to a temperature varying from 450° to 600° C. Steam, preferably superheated, and low boiling oil of (say) a maximum boiling point about 150° C., in the proportions of one volume of oil to about 4·7 volumes of water, are passed through the heated carbonaceous shale. The steam is decomposed during its passage through the heated carbonaceous or spent shale, and the hydrogen produced is utilized to hydrogenate or saturate any unsaturated bodies present in the oil. When employing a vertical retort for the purpose, the steam and oil may be admitted at the top of the retort and the products—oil, excess steam, and gas—be removed by a pipe at the bottom of the retort, or the steam and oil may be admitted at the bottom of the retort and the products be removed by a pipe at the top of the retort. The oil, &c., are conveyed from the retort to condensers, where the steam and the bulk of the oil is condensed; the gas, which still holds some very light oil vapours, being scrubbed or washed with heavy oil, which removes the light oil vapours. When saturated with light oil vapours, the heavy wash-oil can be distilled—preferably with steam—in order that it may yield the light oil.

A door is provided in both the horizontal and/or vertical and inclined retort, so that the mineral matter left after the carbon has been used by the steam may be removed from time to time and replaced by fresh carbonaceous shale. The scrubbed permanent gas may be used to heat the retort or retorts.

The specification (which is not illustrated) next gives examples of the results of working in various ways the process described, and concludes by making the following claims for the invention: (1) The method or process of treating mineral or tar oils, consisting in passing their vapour mixed with steam over carbonaceous spent shale heated to a temperature varying from 450° to 600° C. according to the nature of the oil. (2) The combined or simultaneous cracking and hydrogenating mineral or tar oils by the process as under Claim 1. (3) The combined distillation of shale, and the cracking and hydrogenation of the resulting vapours of shale oil, consisting of heating a retort filled with shale to about 400° C. at the upper part and about 600° C. at the lower part; and conveying steam to the interior of the retort—the oil distilling from the heated shale at the top of the retort being passed

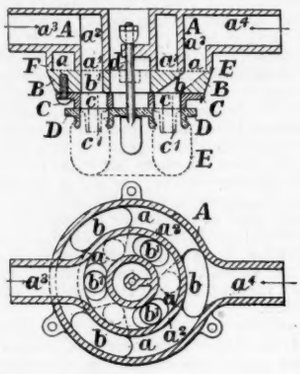
(together with the steam) through the spent shale at the lower part of the retort, the carbon in the spent shale decomposing the steam, and the hydrogen produced being used to hydrogenate the unsaturated bodies contained in the shale oil; the products being drawn away from near the bottom of the retort.

Incandescent Gas-Burners.—No. 127,738.

COVENTRY, W., and JOHNSON, W., of Didsbury, Manchester.

No. 9800; June 14 1918.

These burners for incandescent gas lighting are divided into two or more compartments, each fitted with an inlet pipe to supply gas preferably to a single mantle. The compartments have partitions which it is proposed to dispose annularly (forming two or more annular concentric compartments) and to incline the passages from them so that all the nozzles are around a common circle.



Coventry and Johnson's Incandescent Gas-Burners.

The burner is built-up of several parts—a body A; a gas-duct plate B; a nose piece or nozzle carrying plate C; and a mantle holder D. The body is formed with two or more compartments a a^1, separated by an annular partition a^2 and separate inlet pipes a^3 a^4 to admit the mixture of combustible gas and air to the several compartments. A plate B, with gas-ducts b b^1, is affixed to the underside of the body A; the ducts b communicating with the compartment a, and b^1 with a^1. The gas-ducts b from the outer annular compartment a are inclined inwards, and the ducts b^1 from the central compartment a^1 may be inclined outwards, or the two sets of ducts may be inclined in opposite directions, to bring the orifices into a single circle. The gas ducts b and b^1 alternate; so that if one supply of gas be shut off, an even distribution of gas will be supplied to the burner and mantle. A nose-piece or plate C, to carry the burner nozzles, is fitted over the gas-duct plate, with the apertures c for the nozzles c^1 in a single ring—the apertures coinciding with the ducts b b^1.

Any number of nozzles may be employed according to the size of the burner, some of which receive gas from the inner compartment a^1 and the remainder from the outer compartment a of the burner. Thus with six nozzles (as in the example shown) three may be supplied from the outer compartment a and three from the inner compartment a^1 alternating one with the other. With this disposition when one gas supply is shut off the burner will be illuminated at equidistant points in its circumference.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for July 16.]

Nos. 16,920–17,537.

ANDREWS, W. F.—"Combined gas and water taps." No. 17,535.
FAIRWEATHER, J. H.—"Treatment of ammoniacal liquor." No. 17,186.
GRAY, A. G.—"Means for recording velocity and volume of liquid flowing in a pipe." No. 17,230.
KEMP, A. V.—"Valvular arrangements for controlling flow of gases, &c." No. 17,522.
RAMMAGE, A.—"Acid-resisting pipes, cylinders for scrubbers, towers, &c." No. 17,168.
SCHNEIDERMAN, L.—"Pyrometer." No. 17,001.
SCHROEDER, F. W.—"Gas-burners." No. 16,966.
SMITH, J. A. MANNERS-.—"Illuminating-devices." No. 17,033.
TAPLAY, J. G.—"Treatment of hydrocarbons." No. 16,961.
TODD, J. F.—"Incandescent gas-burners." No. 17,296.
WELLMAN SMITH OWEN ENGINEERING CORPORATION.—See Kemp. No. 17,522.

Increased Consumption at Brechin.—The Brechin Gas Company have a balance on the year's working of £1148. A dividend of 19s. per share, less income-tax, is paid to the ordinary shareholders, and £150 is carried forward. The gas consumed shows an increase of two million c.ft.

Hamilton Gas Committee's Report.—The annual report of the Hamilton Gas Committee shows a balance of £1471. The estimates for the ensuing year bring out a gross profit of £5953. At the next special meeting, the price of gas will be fixed. Steps are being taken to obtain a Provisional Order to increase the borrowing powers from £80,000 to £200,000; and plans have been prepared for an important scheme of improvements and extensions to the gas-works. New mains are being laid to meet the demand for gas.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Edinburgh and Leith Corporations Gas Order Confirmation Bill was read the third time, and passed.

The Pembroke Gas Bill was read the third time, and passed.

The Gas and Water Provisional Orders Bill was brought from the Commons, read the first time, and referred to the Examiners.

The King's Consent was signified to the Bournemouth Gas and Water Bill.

The Bedwellty Urban District Council Bill was brought from the Commons, read the first time, and referred to the Examiners.

HOUSE OF COMMONS.

Progress of Bills.

The Gas and Water Provisional Orders Bill was read the third time, and passed.

The Sunderland Gas Bill was read the third time, and passed, with amendments.

The Bedwellty Urban District Council Bill was read the third time, and passed.

A resolution reported from the Select Committee was agreed to—that in the case of the Ammanford Gas Bill the Standing Orders ought to be dispensed with, and the parties be permitted to proceed with the Bill.

The Pembroke Gas Bill was read the first time, and referred to the Examiners.

The Newark Gas Bill, the Sheringham Gas and Water Bill, and the Huddersfield Corporation Gas Bill were reported, with amendments.

The Middlesbrough Corporation have withdrawn their petition against the Stockton-on-Tees Corporation Bill.

Coal Prices and Gas and Electricity Charges.

Mr. LEONARD LYLE asked the Prime Minister whether, before definitely raising the price of coal by 6s. per ton, he would take evidence from the East End as to its serious effects on the poor, and on the local gas and electricity charges, which also weighed heavily on the consumer.

Mr. BRIDGEMAN, who replied, said it had already been indicated that the Government were gravely concerned with the seriousness of the effects of the proposed increase in the price of coal, but could not hold out hope of an amendment of the Order which had been made until a reduction in the cost of production had rendered it possible to reduce the price of coal.

Mr. FOREMAN asked whether, in increasing the price of coal, the effect the step would have on the supply of cheap gas and light to the community had been taken into consideration.

Mr. BRIDGEMAN replied that the answer was in the affirmative.

Possibilities of American Coal Competition.

Mr. CLOUGH asked the President of the Board of Trade whether the suggested increased price of coal would permit competition in this country by imported American coal, and what steps in that case it was proposed to take.

Mr. BRIDGEMAN replied that the pit-mouth price of coal in America was reported to be 11s. 2d. per ton, against an average of 29s. 3½d. for Great Britain. It was obvious, therefore, that a considerable reduction in freight would have to take place to enable American coal to compete with British coal in Britain. At present, he did not propose to take any action.

Mr. CLOUGH asked whether any American coal was being imported into this country, and what was the rate, freight included.

Mr. BRIDGEMAN replied that he understood that certain negotiations had taken place with a view to the importation of American coal; but he was not aware that any definite arrangements had been made. The usual prices, including freight, quoted for American coal delivered at European ports were from 30 to 33 dollars per ton, or 133s. to 147s. per ton at the present rate of exchange. The lowest firm offer of which he had received information was 23 dollars, or 100s., per ton, delivered at an Italian port. The f.o.b. price included in these figures might be taken at about 20s. to 23s. per ton.

The Coal Industry and Excess Profits Duty.

Mr. HOGGE asked the Chancellor of the Exchequer whether he was able to state the amount of excess profits paid, or payable by, the coal industry for the years 1915-16, 1916-17, 1917-18, and 1918-19, respectively.

Mr. CHAMBERLAIN replied that the net amounts of excess profits duty paid, or payable by, the coal industry, including certain coke-ovens, the profits of which he was unable to distinguish statistically from those of the collieries with which they were associated were as follows: 1915-16, £2,250,000; 1916-17, £8,250,000; 1917-18, £7,150,000. No estimate could yet be made of the amount of excess profits duty payable for accounting periods ended in 1918-19.

Spitzbergen Coal.

Dr. M DONALD asked the President of the Board of Trade whether, in view of the price of coal in this country, he would take immediate steps to inquire into the possibility of procuring a cheap supply from the easily-accessible coalfields of Spitzbergen; and whether he was aware that coal could be procured ready for shipment at less than 7s. a ton in this area.

Mr. BRIDGEMAN replied that he was not aware that development was sufficiently advanced to justify the hope that there would be any very material assistance in the way of a substantial supply of cheap coal from Spitzbergen in the immediate future, particularly having regard to the question of freight; but he was causing inquiries to be made into the matter.

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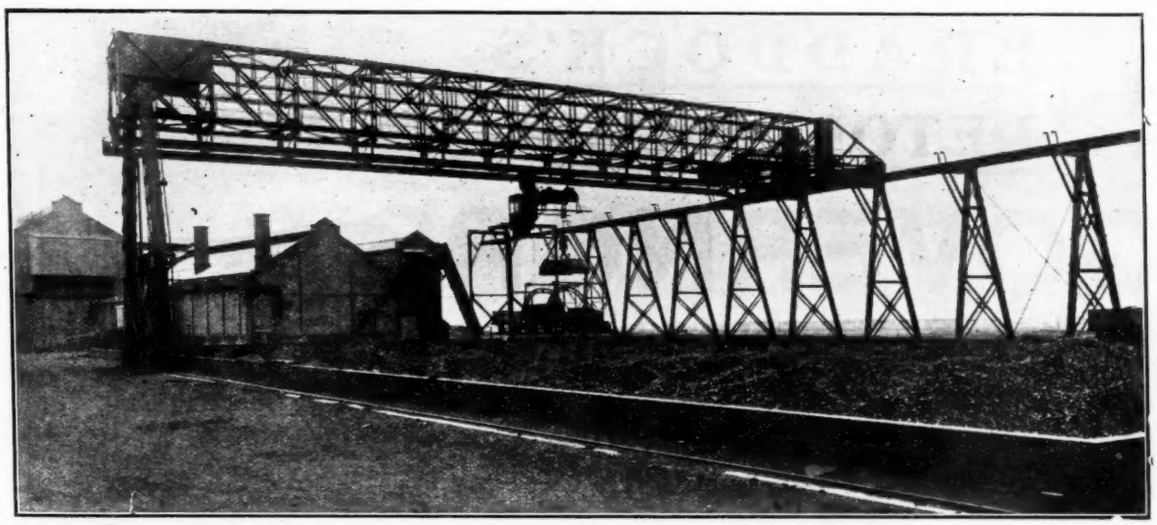

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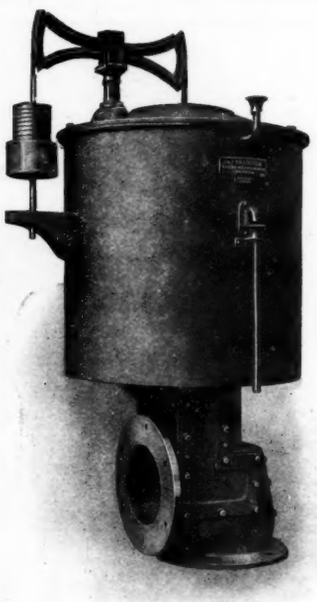

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MISCELLANEOUS NEWS.

EUROPEAN GAS COMPANY, LTD.

In the Time of War.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. H. E. JONES in the chair.

Mr. F. ELIOT WILLIAMS, the General Manager and Secretary, read the notice convening the meeting, and also the following report of the Directors:

The Directors are able to report that, although the Amiens works were out of action for the greater part of the period under review, the total sale of gas shows an increase of 0·38 p.ct.

The cost of coal is again higher than in the previous year; and, moreover, the yield from residuals is less. Great difficulty has been experienced during the year in maintaining the supply of coals to the stations; and conditions have become sensibly worse since the armistice, owing to the scarcity of shipping and the restricted output of coal.

The Company's concession for the supply of gas to the town of Boulogne has been extended for ten years—*i.e.*, until Dec. 31, 1950; and the average length of the concession was 25¾ years on March 31.

The profits of the Company allow of the payment of a dividend of 5s. per share; and the Directors recommend that such dividend be paid on Aug. 1 next, making, with the interim dividend paid on Feb. 1 last, 10s. per share free of income-tax. The balance of £1043 will be carried to reserve of undivided profits.

The works at Amiens, which had been closed owing to the evacuation of the town, were partially restarted in December, 1918; and gas was being supplied in the whole of the Company's district by the end of March. The restoration of the gas supply in this comparatively short period is due to the great energy and skill of the Company's manager and staff, to whom the Directors have already expressed their thanks, which they feel sure the shareholders will wish to confirm.

One of the Company's boats, the s.s. "Nantes," was lost by enemy action in May, 1918; the loss being covered by insurance.

It is with the deepest regret that the Directors have to report the sudden and untimely death of the Managing-Director, Mr. W. Williams. The loss of his energetic and able administration in this influential position can hardly be exaggerated. He had been for forty years in the service of the Company, and for the last eight years had, as Managing-Director, rendered invaluable services, which will leave their mark on the history of the Company. To strengthen the staff, thus weakened, the Directors have appointed Mr. F. E. Williams as General Manager and Secretary. His appointment to the latter post has been rendered necessary by the retirement, after 39 years of most able and valuable services, of Mr. W. B. Brady, the Secretary of the Company, to whom a retiring allowance has been awarded.

The Directors who retire by rotation are Messrs. H. E. Jones and C. C. Carpenter, and the retiring Auditor is Mr. G. C. Goldsmid, all of whom, being eligible for re-election, offer themselves accordingly. The Directors report with much regret the resignation, owing to ill-health, of Mr. J. Reeson, who has fulfilled the duties of Auditor to the Company for 33 years with great competence. Mr. W. B. Brady, having retired from the office of Secretary, offers himself as a candidate for this vacancy.

THE LATE MANAGING-DIRECTOR.

The CHAIRMAN said it became his duty to move the adoption of the report and accounts. The shareholders met for the first time under the ægis of peace; and this enabled them to breathe more freely. Now that the cloud of apprehension, worry, and excitement had passed away, they hoped to do their work under less pressure and anxiety. But the first thing they had to do was, in all humility of spirit, to bear in mind the great change that had come over the Directors' side of the table. There were different faces and different positions. A great change had come over the *personnel* of the staff, under the regretable and sudden demise of their late Managing-Director (Mr. W. Williams). The shareholders would, he was sure, wish to approve a resolution which the Directors forwarded to Mr. Williams's widow and family on the occasion, and to its terms they would all give their heartiest sentiment of regret for the loss the Company had suffered. [Hear, hear.] The resolution was as follows:

> Resolved that the Board record their deep sorrow at the sudden and premature death of their valued colleague and friend, Mr. W. Williams, which deprives them and the European Gas Company of the services of a wise and most capable administrator, who promoted the Company's welfare with exceptional ability and devotion for forty years.
>
> Resolved that a copy of the above resolution be forwarded to Mrs. Williams, with an expression of the Board's deep sympathy and sincere condolence with her and her family in their great sorrow.

The report said truly enough that no language could exaggerate the loss that the death of Mr. Williams was to the Company. It was painfully sudden. He was a powerful man, of great experience, and of great command of foreign languages. He was an extremely steady, faithful, and most kindly and gracious colleague and helper, as he (the Chairman) had himself found during the years they had worked together. Mr. Williams had many qualities. It was most delightful to travel on the Continent with him. He knew it well. He had certain attributes which few people might have suspected. He had a taste for classical literature, Continental as well as English; and it was a great treat to discuss matters of this kind with him. He (the Chairman) mourned the loss of a very faithful and kind friend.

STAFF SHORTAGE AND LABOUR DEMANDS.

The death of Mr. Williams involved a considerable burden upon the Directors. The shareholders could imagine the blow that it was to suddenly lose a man who was (he might say) the flywheel of the undertaking, and who by his long experience had got the whole of their affairs at his fingers' end. They were in this embarrassing position, besides that the staff which was never a large one was seriously depleted. They had their faithful Secretary (Mr. Brady), to whom they hoped to do honour that day. They also had a most competent accountant in Mr. Heather, who was a B.A., and a man of great ability and competence. They had also another very valuable officer, Mr. Martin, but he was away—he had obtained the rank of Captain—at a camp in England serving in connection with the war. He (the Chairman) personally made every possible effort he could to get him released from service, so as to supplement the very depleted staff at the office. They had also Mr. Goldsmid, a short time at the war, but he was back again with them. They had also Mr. Nops back now from the war; and they had two or three ladies who were very capable in their work, and had rendered very efficient and loyal service. As the armistice approached, the work began to increase enormously. Then there arose the spirit of unrest among their workmen; and at every one of the eight works, there was a spurt by the French trade unions to move the men to make fresh demands. They wanted the terms of the very best paid. They were urgent, firm, and decided that they must be better provided for; but they were respectful. So long as the war was on, they appreciated that they were at war; but they had thought that when the war was over, food would suddenly become cheaper. As, however, it did not, they considered the Company should make it up in one way or the other. As in England, so in France they had had the same thing. But the spirit of courtesy and conciliation was perhaps a little stronger in France than in England. There they did not meet with quite the same imperious difficulties as they were accustomed to on this side of the Channel. Nevertheless, the men had to be met; and the Directors did their best. In doing this they were not unmindful of the superior officers and the staff, who had also had their revenues considerably augmented.

THE NEW GENERAL MANAGER.

All this meant that the Board were under constant pressure and anxiety. But fortune favoured. Through an interview he (the Chairman) had with the gentleman who was now on his left-hand side (Mr. F. E. Williams), he found he was expecting shortly to be liberated from most important services he was rendering in the War Trade Department. He was Chairman of a Committee dealing with War Exports. He was originally a simple member of the Committee; but his colleagues unanimously placed him in the chair. His Majesty had also conferred upon him the distinction of O.B.E. The shareholders would have no difficulty in seeing that Mr. Williams, having been trained in a gas office in his earlier days, was a very useful man to bring to their aid. Fortunately, he was liberated from the work; and he came to the Company. Almost immediately, showing the appreciation in which his abilities and command of the German and French languages were held, he was again sent for; and he (the Chairman) received a visit from a distinguished member of the Foreign Office to ask him to release Mr. Williams from his new duties, because nobody they liked so well, or could be found who was better fitted, to go with the Army of Occupation to Germany, and first of all to Paris to make certain arrangements as there was a lot of interpreting to be done. This was a great compliment to their new General Manager; but it was a great blow to him (the Chairman) personally, because he began to see that with extra work and correspondence pouring in, and the staff only up to half its usual strength, he was personally going to have a bad time of it. He had upon him the responsibility, entrusted to him by his colleagues, to come to the aid of the staff almost from day to day. However, they obtained a respite from that; and Mr. Williams came to them.

THE LATE SECRETARY AND THE AUDITORSHIP.

Necessarily, they had, in doing this, to look about them with regard to Mr. Brady, of whose services they could not speak too highly, or too gratefully of the way in which he stepped into the breach on the death of Mr. Williams. He helped him (the Chairman) with his counsel and great experience, as he had since helped Mr. Williams. No matter how competent Mr. Williams was, he came to them knowing nothing about the records of the office, and the peculiar business of the Company, with eight stations working under different concessions and different scales of operation, nor did he know anything of the circumstances and great difficulties as to the supply of coal and material. Towards a knowledge of all these matters, Mr. Brady had rendered him good assistance. Now Mr. Brady and he (the Chairman) had agreed together that, looking at his age, and to the fact that he (like their late Managing-Director) had been nearly forty years in the service of the Company, he might reasonably look to a competent retirement, which the Board were very pleased to think they were able to give to him to his satisfaction. Mr. Brady retired at the end of June; and he now appeared before the meeting in a new light. He (the Chairman) thought he was interpreting the feelings of the shareholders in what he was now about to say. Unfortunately, they had lost through illness Mr. Reeson, their Auditor of many years' standing. Thus there was a vacancy in the auditorship, and he did not think the shareholders could pay their old servant a better compliment while he was able to perform the duties, than to appoint him to take up the duty of one of the Auditors. This would be a happy way of supplementing his pension, and of conveying in tangible form the thanks of the shareholders to him. The report referred to the retirement of Mr. Reeson, and to his unfortunate illness. He was a man, he (the Chairman) had known practically all his professional life—fifty years at least. He was an old officer of the Gas Light and Coke Company; and it was with very great regret that the shareholders, as well as the Directors, had learned of his illness; and of his inability to carry on the work of the audit. A resolution would also be moved reappointing Mr. G. C. Goldsmid an Auditor, and dealing with his remuneration. He need only say that he had made a very proper claim that his remuneration should be reconsidered, because, like every other appointment in which services were rendered, they were accustomed to find that the costs of living and altered circumstances gave ground for further claim. The Board would be only too glad to back up any award the shareholders might in their wisdom and kindness give.

COAL SHIPMENT AND WORKS REPAIRS.

In the report, the Directors spoke of the very great difficulties of the day. One would have thought that when the armistice came, coal would have been plentiful and labour quiet. But this was not so. The submarine menace (which he was thankful to say no longer existed) made things very uncertain, and the cost of insurance enor-

mous. The Company lost, as the report said, their *s.s.* "*Nantes.*" They had, however, four very fine vessels, some of which were brand new; and they had contributed enormously to the supply of coal not only to their own stations, but to other companies in France. The Government had also made use of the ships, so that they had been most valuable to the nation as well as to the Company. The cost of insurance was now much less than before when the war danger was about; and they had hoped that the cost of coal would be cut-down, But, on the contrary, for days its supply had been altogether suspended to France, seeing there were not enough coals for this country. There was a proposal to put 6s. per ton upon the price of coal at home; but when he told them that the price of coal delivered in France was nearly double what was paid in this country, even with the 6s. advance upon it, the shareholders would realize that the position of the Company was one of extreme anxiety and worry. As to the accounts, repairs worked out very heavily, because the smallest piece of work to-day cost three or four times what it did before the war. They had not been able to do sufficient repairing; but they had set aside out of the funds sums with which they hoped, when labour and material could be obtained, to put the works into a fully efficient state, though he doubted whether the funds would be large enough, because the price of material and skilled labour had gone up three or four fold both in France and in England.

GAS SUPPLY IN THE WAR ZONE.

In the report there was a compliment to their manager and staff at Amiens. The Company had had a very special experience. They were practically supplying gas within the zone of war. The Germans were in occupation of Amiens for certain periods during the war. They marched through the city twice; and at other times they kept it under bombardment even to the last minute. They could not operate the works; and the men had to take refuge in dug-outs. But the damage was not so extensive that the works could not be put into operation by last March. Great craters were made by the bombardments both on the works and in the district, which exposed and broke many of their mains. Under these circumstances, the Company's Consulting Engineer had been twice out to see the works. He reported that the conduct of their resident Director (M. Defoy) and his staff could not have been better. When he first went out, they were actually residing in dug-outs on the works. Now he was going to tell the shareholders something which was an amazing illustration of what the shareholders had previously heard him speak about—that was, the commercial integrity of the French nation. Although the price of coal in Amiens must have been £7 or £8 per ton, their stores of coal on the works were untouched; and the small stores of brass and other fittings, as well as other things, were found there still intact; and so the stores were revived in the balance-sheet after the war in the same condition as they were in when the works were stopped. Though the poor people living in this industrial quarter must have been hard up, and could not even get gas let alone coal, they respected the property of the English people in the works. No language of his would be adequate in thanking their neighbours and the town generally for respecting the Company's property under such temptation. As to the loss of the "*Nantes*," they had now a fine fleet of ships; and they had been of extreme advantage to the Company. This was the history of a year of the direst hardship that any company operating in, or in proximity to, the war zone could have experienced. The Company served two of the Channel ports—Boulogne and Havre—which at one time were in tremendous danger from the Germans. The Company had had a most extraordinary experience. Other companies had had their works taken by the Germans. But their own works had been bombarded; and if Boulogne, Havre, and Dieppe had been taken, this would have deprived the front of direct reinforcement of troops and munitions. Thus it was seen why it was the Germans coveted these ports exceedingly. Fortunately the hand of Providence had brought the Allies through.

The DEPUTY-CHAIRMAN (Mr. R. S. Gardiner) seconded the motion, which was unanimously adopted.

THE DIVIDENDS.

On the proposition of the CHAIRMAN, seconded by Mr. A. T. EASTMAN, confirmation was given to the interim dividend of 5s. per share paid on Feb. 1 last, less 6d. per share for duty in respect of all shares held in France; and a final dividend was declared, free of income-tax, for the year ended March 31 last at the rate of 5s. per share, subject to a deduction for French stamp and transfer duty of 6d. per share in respect of all shares held in France. The Chairman remarked that, at the present rate of income-tax, the dividend being paid free of tax was one that was not to be despised.

RE-ELECTIONS OF DIRECTORS.

The DEPUTY-CHAIRMAN moved the re-election of the Chairman as a Director; and in doing so, spoke of his high position in the gas industry, and the universal regard and respect in which he was held. It was the great privilege of the Company to enjoy the benefit of his services as Chairman. What the position had entailed in the way of responsibility, anxiety, and labour during the last twelve months had been sufficiently obvious from the full and modest account the Chairman had given of the work he had done, and especially of the anxieties and labour with which he was faced on the sudden death of their late respected Managing-Director.

Dr. CHARLES CARPENTER seconded the motion, which was heartily passed.

Moved by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, Dr. Carpenter was re-elected to his seat at the Board.

THE AUDITORS.

Mr. JAMES H. SOLOMON moved and Mr. F. BEAUSIRE seconded, the following series of resolutions regarding the Auditors: "(1) That Mr. G. C. Goldsmid be re-elected as an Auditor of the Company at a remuneration of 100 guineas per annum. (2) That Mr. W. B. Brady be elected as an Auditor of the Company at a remuneration of 100 guineas per annum. (3) That the remuneration of the Auditors in respect of the year 1918-19 be payable at the rate of 100 guineas per annum each."

A SPECIAL VOTE OF THANKS TO THE STAFF—WAR HONOURS.

The CHAIRMAN said he was sure the shareholders would not like to disperse without thanking the members of the staff in London and abroad for their services in this year of great trial and difficulty, and during the war. On this occasion he wished to propose a special resolution:

That the best thanks of this meeting be given to the staff of the Company in London and abroad for their services during the past year. That this meeting further desires to place on record its appreciation of the loyalty and zeal of the Company's Managers and staff abroad during the late war, and to express its thanks for their unremitting and successful efforts to maintain the supply of gas in spite of conditions of the greatest difficulty.

The Chairman referred again to the work of the London staff in terms of praise as in his opening address. In referring to the new General Manager, he said he was sure Mr. Williams would keep before him the admirable example that his own father furnished of how similar duties should be administered and carried on. Regarding their officers abroad, M. Gautier, of Havre, was the *doyen* of their Engineers. In him they had a man who had been so many years with the Company that he believed he capped Mr. Brady in length of service. How long he would decide to go on, or whether he would seek retirement, was a matter he (the Chairman) should be prepared to hear of almost at any time. Then they had M. Huon at Nantes, who was an Engineer of ripe age and experience. He was confronted with the task of building new works on a new site; and they would get considerable improvements there. He was a man of great capabilities, power, and accomplishments. Then M. Coudelou, of Rouen, was a man who had been many years in the Company's service; and he did his work with very great diligence. Major Louis Cros, of Boulogne, was a Chevalier of the Legion of Honour, like their Deputy-Chairman. He had won the Croix de Guerre; and he was mentioned in despatches in May last. He was an engineering officer attached to the artillery; and the official despatches made the following record:

An officer without equal, who has succeeded in communicating to his battery a spirit which made it in a very short time a unit of the first class. On the Somme in 1916, and on the Aisne in 1917, the accuracy of his fire, and the careful and constant maintenance of his liaison, resulted in his gaining and keeping permanently the absolute confidence of the infantry whom he was supporting. In particular on the Aisne, he went forward on several occasions to the advanced infantry posts, which were being heavily shelled, in order himself to regulate the fire upon important points.

This was a very fine tribute, which showed that the Company's officers had done something for their country. Their Captain Georges Barré had been made a Chevalier of the Legion of Honour; and Captain Jules Croiet had won the Croix de Guerre. It would be seen from this that the Company's men had done their work well in the war, and had deserved well of the nation. He had not mentioned M. Bertin, of Caen; and there were other excellent officers. But he had spoken of the few because of the special circumstances connected with them. He (the Chairman) must begin to look forward to the time when he must lay down his own sword as a soldier of fortune. But it was a great pleasure to him to have been associated with this Company, and with such fine men. The late Mr. Williams always surrounded himself with capable, well-trained men; and the Company had the benefit of this now. They had men of high principle and courage in their service, upon which they reflected the highest credit.

The DEPUTY-CHAIRMAN, in seconding, said that on no occasion had it been more incumbent upon the shareholders to record their appreciation of the services of their very able staff at home and abroad. Since the armistice, their managers abroad had been freed from the physical dangers and risks which they had undergone for years; but their difficulties, and those of the Chairman, he was afraid had been even greater now than then. The demands of labour, the cost of labour, the difficulty of procuring a sufficient amount of labour, the increasing demand for gas, the difficulties of repairs and of augmenting the plant, and the troubles with regard to the supply of coal, had all to be met daily; but they were meeting them with great success. One might think that after their anxieties and dangers, their officers might be inclined to relax a little, instead of which they were eagerly dealing with their difficulties day by day.

The CHAIRMAN intimated that the Board had recently revised the remuneration of the whole of their chief officers and staffs in France, as they had done in London. From the heads of different stations, they had had two or three letters expressing, in warm and grateful terms, their thanks for what had been done.

The motion was very heartily passed.

The GENERAL MANAGER (Mr. F. E. Williams), on behalf of the staff at home and in France, cordially thanked the shareholders for the vote. In London, he remarked, they had many anxieties regarding the supply of coal; but they were nothing to the anxieties of the manager on the works who saw his coal stock dwindling away every day. All their managers had kept, or had again got, their works going; and it would be a great satisfaction to the whole of the staffs abroad to know that the shareholders realized and appreciated the efforts they had made on behalf of the Company. Of the staff in London, he should like to say that, as a new comer, he had received the most loyal support from them all; and Mr. Brady had placed at his (Mr. Williams's) disposal unreservedly his great knowledge of the Company's affairs. To him and to all he was under a debt of gratitude. He should like to thank the Chairman and Mr. Gardiner for what they had said of his (the speaker's) father, whose life's interest was bound up in the Company. If he could earn the approval of the Board and the shareholders by keeping up the high standard his father set, he should feel he had done well. [Hear, hear.]

Proposed by Mr. SOLOMON, and seconded by Mr. G. C. GOLDSMID, a hearty vote of thanks was also passed to the Chairman and Directors.

VOTE FOR THE FRENCH RED CROSS.

The CHAIRMAN, having replied on behalf of himself and colleagues, submitted a resolution voting a contribution of 200 guineas to the French Red Cross.

The DEPUTY-CHAIRMAN seconded the motion; and it was unanimously passed.

WALSALL GAS-WORKS ACCOUNTS.

The Deficit Discussed.

The accounts of the gas undertaking for the past financial year—which showed a deficit of £10,469—were discussed at last week's meeting of the Walsall Town Council.

It was mentioned by the Chairman of the Gas Committee (Mr. John Venables) that this was the first time in the history of the undertaking that a loss had been incurred. He said the position which had arisen in this instance was due to circumstances over which the Committee had no control. The income had amounted to £93,490; but owing to the continued advances in the prices of coal and other commodities, the expenditure had been £100,314. If there was any blame attaching to anyone, it must be accepted by the Council for having in 1915 refused to allow the Committee to spend £18,000 in the provision of vertical retorts. Had this expenditure been sanctioned, it would have made a difference to the undertaking of £24,000. At the same time, the cost of the vertical retorts had gone up from £18,000 to £39,000. Analyzing the figures in the balance-sheet, Mr. Venables pointed out that wages had increased by £11,000; and with the cost of coal and other materials added, the cost of manufacture had gone up by £24,621, though the gas produced showed a diminution of 20,000,000 c.ft. The Committee proposed that the deficiency be made up from a special reserve fund; and they were now seeking powers to raise the maximum statutory price of gas from 4s. to 5s. per 1000 c.ft. In view of all the difficulties the Committee had been up against, they were lucky in getting off with a loss of £10,000. As to the future, the Committee had been fairly sanguine until the bombshell of the extra 6s. a ton for coal. This, with further wages increases, would add to the expenses of the undertaking to the tune of £20,000.

Asked how it was the Committee agreed to contribute £6000 in relief of the rates, Mr. Venables replied that they yielded to pressure put upon them, and were not aware at the time what the financial position would prove to be. Alderman Ingram expressed surprise that the Committee were not kept informed as to the financial position, so that the price of gas could have been revised to meet the increased costs. Mr. Talbot urged that the position was one which called for the adoption of stringent measures, in order that there should be no repetition of such an unfortunate state of affairs. Mr. Ward (Vice-Chairman of the Gas Committee) said the simple explanation was that the expenditure of the undertaking had increased by 100 p.ct., and the revenue by only 50 p.ct. The Committee had been forced by the Government to use a water-gas plant; and this had entailed a considerable loss. At the same time, owing to the plant at the works not being up to date, labour cost twice as much as it should have done. The mistake which the Committee had made had been in not increasing prices earlier. Alderman Pearman-Smith described the attitude taken up by the Chairman as amazing. The worst feature of the matter was that the Committee had been voting to the relief of the rates money which the undertaking had not earned. It was the most abominable piece of municipal finance he had ever heard of. He proposed, as an amendment, that the Council appoint a Special Committee to investigate the affairs of the gas undertaking.

Eventually the amendment was withdrawn, and the accounts passed, on an assurance being given by Mr. Venables that the Gas Committee would appoint a Sub-Committee specially to inquire into the finances of the undertaking, and that a report should be presented to the Council on the subject.

MANCHESTER CORPORATION GAS UNDERTAKING.

Annual Report and Accounts.

There was a meeting of the Manchester Corporation Gas Committee last Tuesday, at which the report and accounts for the year ended March 31 were approved.

The income from the sale of gas for the past year was £866,129, and from residuals £355,856; the figures for the preceding year having been respectively £816,289 and £352,579. Adding sundry receipts, the total income reaches £1,223,115, as against £1,169,911. On the other side, the expenditure was £1,044,014, compared with £922,341; the gross profit for the year being £179,101, whereas twelve months ago it was £247,570. Deducting the amount (£87,831) paid for interest on loans, &c., a net profit of £91,270 is arrived at; the corresponding figure twelve months ago having been £194,140. The net profit (including £26,930 transferred from the reserve fund) has been appropriated as follows: Sinking fund for redemption of loan debt, £59,430; city fund in aid of rates, £31,204; applied in extension of works where borrowing powers are not granted, £27,566; total, £118,200.

The quantity of gas sold was 5,412,822,000 c.ft., a decrease of 4·35 p.ct. on the corresponding figures for the previous year; and the average price realized was 3s. 2·04d. per 1000 c.ft. The cost of coal and oil carbonized, per 1000 c.ft. of gas sold, was 2s. 0·22d., less the income of 1s. 3·78d. from residuals, leaving the net cost at 8·44d., compared with 5·73d. for the previous year. The difference represents an increased cost to the Committee of £61,120. The average gross cost of coal only, inclusive of cost of handling, was 24s. 2·97d. per ton, as compared with 20s. 7·06d. for the previous year.

Under the heading of income-tax, the net amount borne by the department was £48,717. An appeal, however, is pending; and it is anticipated that an appreciable concession will be secured. Appeals have been made during the year, with the result that the assessments for poor-rate purposes are reduced from £128,639 to £114,549.

The amount transferred from revenue to the credit of the renewals account was £72,376, which, together with the interest on the fund, made a total credit for the year of £77,418. The sum of £67,415 was expended during the year. The balance to the credit of the account is now £178,086.

Additional loan capital to the extent of £20,000 has been raised during the year. The expenditure for the year amounts to £27,872. Of this sum, £27,565 has been provided out of net profits, and the balance out of loans. The total capital outlay at March 31, 1919, was £3,148,305, the loan debt in respect of which was £870,512. The balance of sinking fund not actually applied to the redemption of debt at the same date was £86,859.

Application has been made to the Local Government Board for sanction to the borrowing of £595,000, being the balance provided for by the Manchester Orders of 1893, 1899, and 1904. Application has also been made to the Board to alter or amend the provisions of certain Acts so as to confer upon the Corporation power to borrow for purposes connected with the gas undertaking the further principal sum of £1,000,000. The immediate requirements in respect of these sums are £711,100 for manufacturing plant (mainly at the Bradford Road works), and £210,000 for distribution plant—*i.e.*, mains, meters, cookers, fires, &c.

Many of the largest gas undertakings have recently made substantial advances in their prices to meet the increased costs of labour and coal; and it is desirable that the Committee should take the question into consideration without delay. The estimated deficiency at March 31, 1920, was £65,871; and since the estimates were presented the hours of day workers have been reduced from 52 to 47 per week, with no reduction in pay, and shift workers' wages increased by 6d. a shift, in lieu of shorter hours. It is estimated that these concessions will cost the department £15,000 per annum. In addition to the concessions already referred to, the wages of general workers have been increased twice during the past year. The additional cost of increases granted during the year will be approximately £49,000 per annum.

—	Year 1918.	Year 1919.	Increase + Decrease —	Per Cent.
Material carbonized—tons	494,293	456,476	− 37,817	7·65
Gas made—Thousands c.ft.	6,054,664	5,859,350	− 195,314	3·23
,, per ton—c.ft. . .	12,249	12,836	+ 587	4·79
Calorific value, B.Th.U. gross.	492	476	− 16	—
Output of gas from works, Thousands c.ft. . .	6,048,553	5,862,279	− 186,274	3·08
Gas sold, Thousands c.ft. .	5,658,976	5,412,822	− 246,154	4·35
Gas unaccounted for (adjusted)	177,073	230,387	+ 53,314	—
Do. per cent. on output .	2·93	3·93	+ 1·00	—
Total number of consumers (including automatic) .	195,338	197,071	+ 1,733	·89
Number of automatic consumers	80,558	81,926	+ 1,368	1·70

The quantity of gas sold during the past year was 5,412,822,000 c.ft., as compared with 5,771,415,000 c.ft. for the year ended March 31, 1914, a decrease of 358,593,000 c.ft., or 6·21 p.ct. If the normal expansion had continued, the sales of gas last year would have been about 1000 millions more, which would have effected very considerable economy in the costs of production, distribution, and management.

The Household Fuel and Lighting Order came into operation in regard to gas as from Sept. 29, 1918; and the restrictions were relaxed to the extent of 25 p.ct. from the meter readings in the December quarter. The reduction in consumption of gas during this period was:

	Cubic Feet.	Per Cent.
October—December, 1918	214,300,000	11·59
January—March, 1919	14,003,000	0·80
For the six months	228,303,000	6·32

During the war, the following materials for the manufacture of war munitions and high explosives were supplied to the Government from the Manchester Gas-Works:

Benzol	803,799 gallons.
Toluol	267,933 ,,
Solvent naphtha	89,311 ,,
Concentrated oil of vitriol	5,600 tons.
Concentrated ammoniacal liquor	9,600 ,,

The general public do not appear to realize the great assistance the gas industry of the country has rendered to the Government in the successful prosecution of the war; and it is hoped that, when the Official History of the conflict is compiled, the Institution of Gas Engineers or the National Gas Council will see that adequate statistics are available to the historian of the part played by gas undertakings in the great struggle.

The Committee desire to place on record their appreciation of the services rendered during the past four-and-a-half years by the officials and workmen of the department, and to congratulate them on maintaining the supply of gas to the city in a time of anxiety and stress such as has not been before experienced in the long history of the undertaking.

The report is signed by Alderman William Kay (Lord Mayor and Chairman of the Gas Committee).

The Welsbach Light Company, Ltd., have subscribed £50,000 to the Victory Loan.

Three more plants on Tully's carburetted hydrogen system are on order—viz., for Knottingley, 100,000 c.ft. per day capacity; Conway, 100,000 c.ft. per day; and Burnham (Essex), 75,000 c.ft. per day.

A mechanical engineer at Cagliari (Sardinia) would accept an agency for cast iron and steel water-pipes, galvanized water and gas pipes, and boiler tubes. Inquiries should be addressed to the Department of Overseas Trade (Development and Intelligence), No. 4, Queen Anne's Gate Buildings, S.W.1.—quoting Italy, No. 1698.

Colonel Sir E. A. Brotherton, M.P. for Wakefield, the well-known chemical manufacturer, is presenting about 8000 children in the local elementary schools, as a peace offering, with a bank-book and an opening deposit of a shilling. This is not the Colonel's first gift of this kind. In 1902 he presented 9000 such books and shillings; in 1906, 6000; and in 1911, 5900.

THE ELECTRICITY SUPPLY BILL.

The Gas Industry and "Any Form of Energy"—Proposed Amendment.

Although the gas industry has a general interest in the Government Electricity Supply Bill, which is now before a Grand Committee, it is not directly concerned with it except on one point of detail. Under sub-section 2 of clause 15, the district boards which are to be formed under the Bill for dealing with the supply of electricity in various districts to be constituted later when the Commissioners have been appointed, have powers to do certain things which the National Gas Council are advised may include the supply of gas. The sub-section reads as follows:

> (2) A district electricity board and any company or person may, with the consent of the Electricity Commissioners, enter into arrangements for the utilization, for the purposes of the board, of water power, waste heat, or other form of energy which the company or person may be able to dispose of, or for the supply by the board of any form of energy other than electricity; and where such an arrangement has been made, the district electricity board may be authorized, by Special Order, to exercise such powers (including the power to break-up roads, railways, and tramways) as may be necessary for the purpose of conveying such energy.

The proceedings in Grand Committee are somewhat different from those of a Select Committee, in that evidence is not heard in the usual way, nor are interested parties represented by counsel. The procedure is to take each clause seriatim, and for members of the Committee to propose amendments; the final decision being given by vote of the Committee, after the manner adopted when the House itself goes into Committee. The National Gas Council therefore have taken steps to have an amendment proposed by a member of the Grand Committee with a view to removing the ambiguity complained of in the sub-section set out above. What is to be suggested is the insertion of the words "gas or" before the word "electricity" in the seventh line of the sub-section as printed in the Bill; so that the particular sentence would read "or for the supply by the board of any form of energy other than *gas or* electricity"—the added words being in italics. This would have the effect of confining the operation of the clause to the supply of electricity. It is understood that this is the intention, and that the real object of the sub-section is to give the district board powers to break-up roads for the purpose of laying cables, and even gas-mains for the conveyance of gas which has been purchased. Amended as suggested, the clause would give these powers. As only the early clauses of the Bill have so far been dealt with, and the Committee will sit only three days a week, it is probable that clause 15 will not be reached for a short while, as there are an enormous number of amendments to the various clauses from the electricity supply industry.

WARRINGTON GAS UNDERTAKING.

Application to Borrow £40,000.

An inquiry into an application by the Warrington Corporation for sanction to the borrowing of £40,000 for the installation of a water-gas plant at the Longford Gas-Works was conducted last Wednesday by Mr. W. M. Cross, an Inspector of the Ministry of Health, at the Town Hall.

Mr. A. T. HALLAWAY (the Town Clerk) said that a report presented to the Gas Committee by Mr. William Newbigging, Consulting Engineer, in the early part of this year showed that the gas undertaking was not in a position to supply all the demands they expected would be made upon it. In fact, during last winter more than ordinary difficulty was experienced. The main reason why the Gas Committee found themselves in such a position was that they did not go on with extensions to the works in 1915. The Engineer reported in 1914 that it would be necessary to put down new retorts, and that in order to obtain the apparatus to deal with the demand they would have to spend £30,000 or £40,000. To-day, while the subject-matter of the present application was £40,000, they had in view additional expenditure of over £100,000. Rightly or wrongly, the Gas Committee at that time were of the opinion that the Treasury restrictions on the issue of new loans would prevent their borrowing the necessary money; and it was not done. Certain works were carried out; but this was out of the revenues of the undertaking and the reserve fund. The application was something in the nature of a stand-by. It was impossible for them to carry out the larger extensions and have them in operation for the winter of 1919-20. They hoped that, in the event of their application being successful, it would be possible to have some of the plant in operation for next winter.

Mr. WILLIAM NEWBIGGING, in support of the application, said that the outstanding feature of the position was that the carbonizing plant at the gas-works was inadequate, but only in the sense that its output capacity was not equal to the day's consumption, but because it had no margin of reserve. He supported the recommendation made by Mr. W. S. Haddock (the General Manager of the undertaking) that a water-gas plant should be installed, because not only could it be erected quickly and be of service during the coming winter, but it would be impossible to get put up in a short time such an instalment of a coal-gas plant as he would recommend the Corporation to build eventually. If the contract had been placed in the early months of this year for a vertical retort installation, they could not have had it completed and ready for work by the winter of 1920-21. The water-gas plant which was proposed was complete in every respect, and fully in keeping with modern requirements.

Mr. HALLAWAY, in reply to the Inspector, who raised the question of the ultimate financial requirements of the undertaking, said that if the Ministry asked them to state a definite figure, they would ask for £200,000 to carry them over the next ten years.

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Mr. NEWBIGGING, questioned by the Inspector, pointed out that the gas had not been restored to its pre-war quality; the Government having extended until the end of October the period during which the statutory standard should not be enforced. He anticipated that there would be a renewal of this concession, so as to see the gas undertakings through next winter. It was not expected that the amount of coal raised would be anything like sufficient to meet the demand. Up to quite recently, in Manchester, they had been working with a stock equal to only three days' use.

The inquiry was then closed.

STOCKPORT GAS EXTENSIONS.

Local Inquiry.

At the Stockport Town Hall on Tuesday last, Mr. W. M. CROSS, an Inspector of the Ministry of Health, held an inquiry into an application by the Stockport Corporation for sanction to borrow £43,720 for the purposes of their gas undertaking.

Mr. S. MEUNIER, the Gas Engineer, stated that £2000 was for the cost of laying mains to the new works of Crossley Bros., Ltd., and the National Aeroplane Factory (Crossley Motors, Ltd.), both at Heaton Chapel. The sum of £2320 was for a sulphate of ammonia plant. The erection of the plant was necessitated by the purchasers of the ammoniacal liquor giving notice, under the terms of the contract, to terminate it. It might have been possible to sell the liquid to another firm, but at a much lower price. The sum of £5500 was for the laying of 1240 yards of 16-in. main from the gas-works at Portwood, to the Bredbury boundary of the borough. The sum of £18,000 was for the purposes of general extensions to mains and services, and was based on the average expenditure over a period of three years. It was estimated that £15,000 would be required for expenditure over a similar period for stoves and gas-fires.

Mr. R. HYDE, the Town Clerk, said that the price of gas in Stockport was high—something like 5s. per 1000 c.ft. There had been considerable difficulty at the gas-works in connection with the manufacturing plant; and they were about to instal a new carbonizing plant there. They had been making losses on the gas-works for some little time, owing principally to the carbonizing plant not being capable of turning out gas economically. The increased price of gas at the present time was to some extent attributable to the desire to overtake these losses. When the new carbonizing plant was installed, he thought they ought to be able to knock 2s. off the price of gas.

Mr. MEUNIER pointed out that new carbonizing plant was under consideration before the war broke out; but the war stopped any further progress. A scheme for the new plant was being got out now. The losses on the undertaking were £25,000 in the last three years—and, he added, they were formerly making more than this in one year.

The inquiry was then closed.

BENZOL AND POWER-ALCOHOL PRODUCTION.

Motorists' Meeting at Luton.

At a meeting of motorists and others interested in motor transport, held by the Automobile Association at Luton, on the 7th inst., a resolution was passed calling on the Government to stimulate the use of the home-produced fuels—power-alcohol and benzol—by immediately giving effect to the Departmental Committee's recommendations on the utiltzation of power-alcohol, and also the Fuel Research Committee's recommendations on gas standards, providing that all gas companies be required to extract the whole of the benzol from their gases.

Mr. HUGHES CUMBERLAND (who presided) said that fuels as good as, and infinitely cheaper than, petrol could be produced in this country which would not only benefit financially, but be of enormous importance otherwise to, the motoring industry.

Captain MONTGOMERY (the Organizing Secretary of the Motor Fuels Joint Committee) mentioned that these meetings had been described as "protest meetings" against the price of motor spirit; but he and those with him, who were doing their best to encourage home fuels, were not such fools as to think that any good could come of protesting to the petrol companies. The only way of dealing with the monopoly, as it was at present, was to put something up against it. To ask the Government to regulate the price of a commodity not produced here was out of the question. What they could do was to ask that every facility be given for the home production of fuels which would meet motorists' requirements. Within eight or twelve months, three-quarters of the amount of motor spirit used in this country annually could be produced here.

Major STENSON COOKE (the Secretary of the Automobile Association) said that, if we were properly governed, we ought not to have to spend time telling the Government how to run its business; but we must go on "gingering" the Government until this job was done. It would not be a "nail in the coffin" of the petrol monopolists, but it would water their dividends.

Mr. HAROLD KITCHEN moved, and Mr. PERCY ALLEN seconded, the resolution; the latter saying that he got 25 p.ct. more power and distance from mixing benzol with a small quantity of petrol.

Dundee Gas Accounts.—During the year ended April 30, the quantity of gas delivered from the works of the Dundee Gas Commissioners was 1,291,476,000 c.ft.; the capital standing at £277 per million cubic feet. With a price of gas in Dundee (subject to a discount of 5 p.ct.) of 3s. 3d. per 1000 c.ft., there was an income of £232,835. The expenditure was £193,454; the balance being thus £39,380. After meeting the annual charges, there is a profit of £2145, which compares with a loss of £2042 for the preceding year.

Gas and the Housing Problem.

PENDING the necessary provision of new houses, the best has to be made of existing accommodation. The essential economy of space is secured by the use of the ideal Cookers in present circumstances — Main's "Kent," "Sussex" and "Surrey." These efficient and compact cookers embody all recent improvements and are designed with a view to securing the minimum cost for maintenance.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 21.

There is a considerable inquiry for pitch to be shipped next season, and the outlook is good; the minimum price being 65s. net per ton f.o.b. makers' works. The exports of pitch over January-June last were most encouraging; being largely in excess of pre-war periods. Creosote is strong at 5¾d. to 6d. net per gallon in bulk. There is no change to report in pure benzol at about 2s. 9d. net, pure toluol at about 2s. 9d. net, and 95/160 solvent naphtha at about 2s. 4½d. net, all in bulk *ex* makers' works. The upward movement in carbolic crystals may raise the price for 60's crude carbolic acid to an acceptable figure.

The position of sulphate of ammonia for Home agriculture is improving, and business has been done at £19 10s. (less 10s. to factors) on 24½ p.ct. basis, bags free, and carriage paid within a reasonable distance; the temporary fall clause having disappeared.

Tar Products in the Provinces.

July 21.

The average values for gas-works products during the week were: Gas-works coal tar, 35s. 9d. to 40s. 9d. Pitch, East Coast, 61s. 6d. to 64s. per ton f.a.s.; West Coast—Manchester, 53s. 6d. to 56s.; Liverpool, 53s. to 56s., Clyde, 60s. to 62s. 6d. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.c., at 120° C. 11d. to 1s. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 11d. Heavy naphtha, North, 2s. 3d. to 2s. 5d. Creosote, in bulk, North, liquid, 5d. to 5¼d.; salty, 4½d. to 4¾d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct. 1s. 2d. to 1s. 4d. Naphthalene, £16 to £18; salts, £5 to £6, bags included. Anthracene, "A" quality, 7¼d. to 7½d. per minimum 40 p ct.

FROM A MARKET CORRESPONDENT.

Tar Products.

Conditions show practically no alteration on the week; the trade having pursued a waiting attitude with regard to the coal situation. Unfortunately, the coal miners have decided to reject the Government's offer, and, consequently, the cost of coal will be increased by 6s. per ton from the beginning of the current week. It is difficult to estimate at the moment the effect of this advance on bye-product markets. The cost of production obviously will be higher; but whether this extra cost can be recovered from purchasers is another problem, which time alone will solve. Unfortunately, it comes at the very moment when, for the first time, a real effort is being made to fight the importing ring, who have controlled, and still control, the price of motor spirit. It seems practically certain that the extra 6s. a ton cannot but affect the price of benzol, which is now stocked by well over a thousand agents throughout the country, in addition to the recent concession permitting individual storage in large drums under easy conditions. Just when this promising young development of the greatest national importance is shaping well and gathering strength daily, in spite of all outside influences, it is stabbed in the back. It is too early to assess exactly what it will mean to benzol, and how far it will go towards killing its chances as a competitor of petrol; but it is certainly playing into the hands of the American petrol ring at the expense of our home industry. Prices for the present are without alteration. Pitch is a strong feature at generally higher quotations. South Wales buyers are much in evidence, as they need the pitch urgently for their briquette works; there being every prospect of extensive demand for patent fuel. Manchester prices are rising; but how much further the advance here will go is very doubtful at the moment, in view of the decision with regard to facilities at Liverpool which come into operation on Aug. 1. Carbolic acid maintains its recent improvement, and solvent naphtha seems to be on the up-grade again—there being signs of improvement in the rubber goods trades. Refined naphthalene is steady; but crudes are rather better on small buying for the fire-lighter trade, which has made its appearance rather earlier than usual. Other products are without change.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North, 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 9½d. North; crude 60-65% 1s. 3½d. to 1s. 5½d.; pure, 3s. per gallon naked.

Carbolic acid: Crude 60's 1s. 6d. per gallon nominal; crystals, 40%, 5d. per lb. asked.

Crude Tar: London, 44s. to 46s.; Midlands, 40s. to 42s.; North, 40s. per ton *ex* works.

Pitch: London, 67s. 6d. to 70s. per ton; East Coast, 55s. to 60s. per ton; West Coast, 54s. to 58s., with Manchester 57s. per ton and Glasgow 58s. per ton; South Wales, 63s. to 65s. per ton.

Solvent Naphtha: London, 2s. Provinces average 1s. 10d. per gallon.

Crude Naphtha: Naked, 10d. per gallon.

Heavy Naphtha: 2s. 3d. per gallon.

Naphthalene: Refined, £15 to £17 per ton nominal; crude, £3 10s. to £8, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d.

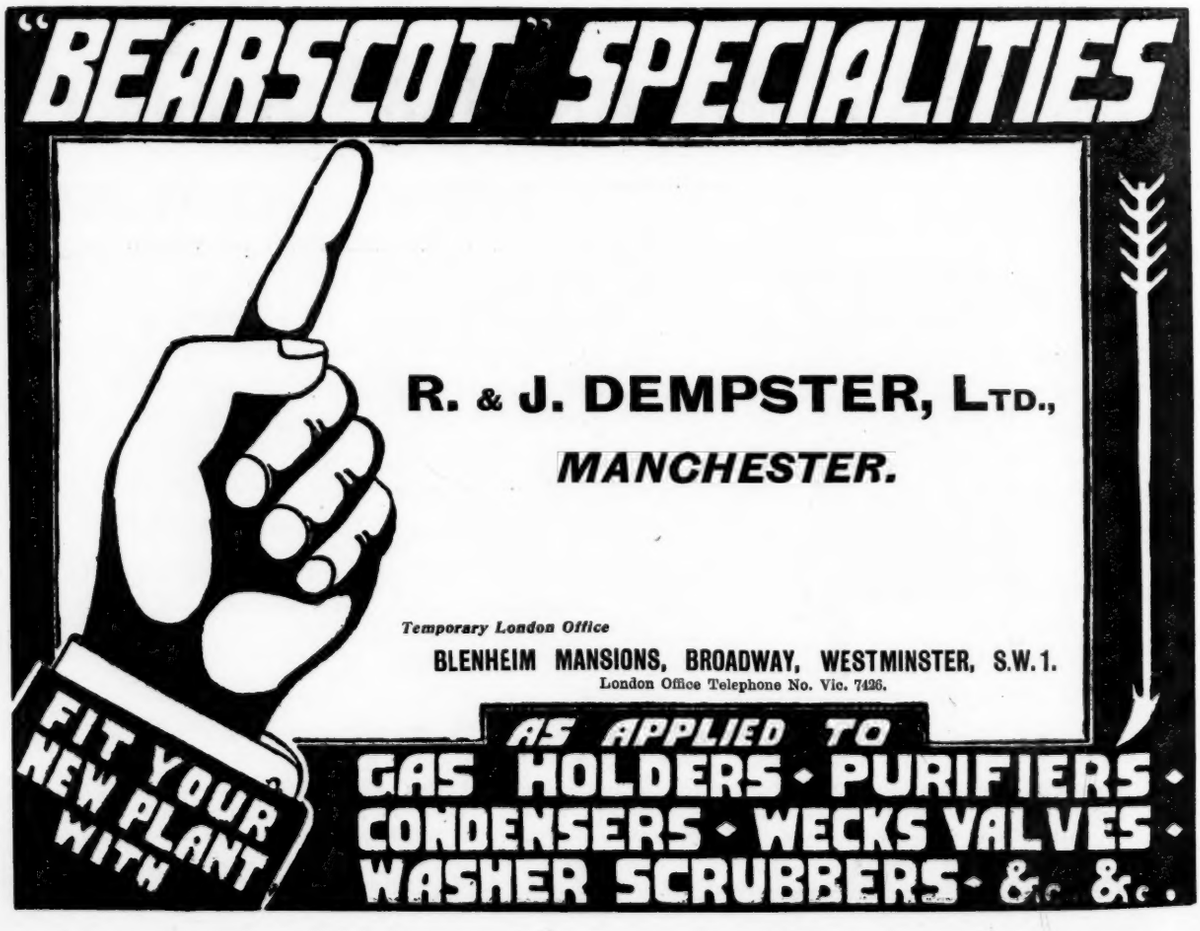
Creosote: London, 7¼d.; North, 5¾d. to 6¼d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 6d. to 8d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95%, 2s. 4d. to 2s. 6d.; 97-99%, 2s. 7d. to 2s. 9d. *ex* works London, f.o.b. other ports.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The home position remains about the same, with export business still restricted. Meanwhile, America is exporting large quantities to some of our pre-war markets at quotations well below £20 per ton. Prospects do not look very rosy, and certain trade circles are getting dissatisfied with the action of those who are supposed to have the matter in hand in the interest of all.

Satisfactory Results at Motherwell.

Having considered the report for the year ended May 15 of Mr. John Wilson (the Gas Engineer and Manager), the Motherwell Gas Committee placed on record in the minutes their appreciation of Mr. Wilson's excellent management of the undertaking, as evidenced by the very satisfactory results of the year's working. In moving the adoption of the Committee's minutes, Mr. Frood said he thought the report was a remarkable one, considering the times they had passed through. They had a very large increase of gas manufactured, and this with a decrease of 2392 tons of coal over last year. The whole report was a monument to the skill, perseverance, and knowledge of Mr. Wilson and his staff. On the year's working they had been able to pay £8512 as interest on loans; they had put £4138 to the sinking fund, besides being able to wipe out two deficits left over from last year amounting to £1493; and after this they had a balance of £765 to carry over to next year. Great credit was due to Mr. Wilson for the good position the concern now occupied. Mr. Wilson's manufacturing statistics show that from 12,557 tons of coal 160,496,500 c.ft. of gas were made, or 12,781 c.ft. per ton of coal. In the previous year 14,949 tons of coal produced 156,511,000 c.ft. of gas, or 10,469 c.ft. per ton. The relative financial positions of Motherwell and Wishaw are to be considered, with a view to their amalgamation; and meantime, as already recorded, Mr. Wilson is to act as Gas Manager at Wishaw, in addition to his present duties.

Southend Strike at an End.—The strikes of the Gas Company's employees and of men in the service of the Southend Corporation came to an end last Saturday week.

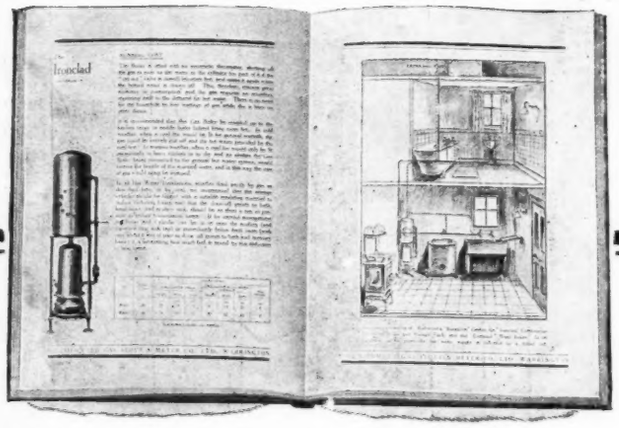
Reduction in Price at Selkirk.—The Selkirk Gas Company have paid a dividend of 5 p.ct., placed to depreciation £450, carrying forward £326. The price of gas is reduced 2½d., to 4s. 7d. per 1000 c.ft.

Boston Gas Company.—Presiding at the annual meeting of the Boston (Lincs.) Gas Company, Mr. W. Pooles said the cost of coal had increased £1400, and wages £1260. The report and accounts showed a net profit for the year of £438, after writing off £1637 for depreciation. The balance standing to the credit of the profit and loss account, after payment of the interim dividend in February last, amounted to £7807, out of which the Directors recommended payment of the remainder of the full parliamentary dividend on both classes of shares, less income-tax, which would absorb £962, leaving a balance to be carried forward to next year's accounts of £6844.

Supply of Drugs During the War.

There has been presented to Parliament a memorandum on the special measures taken by the National Health Insurance Commission in relation to the supply of drugs and other medical stores during the war. Previous to that time, of course, this country was largely dependent on Germany for the supply of many highly important synthetic drugs and other medicinal compounds and products; and on the outbreak of hostilities immediate steps had to be taken to encourage the production in this country of drugs for the supply of which we had hitherto wholly or mainly relied upon enemy countries. The task of maintaining an adequate supply of drugs and other medical stores was entrusted to the Insurance Commissioners; and the report gives details of the steps taken to this end. In a prefatory note, Mr. Waldorf Astor (the Chairman of the National Health Insurance Joint Committee) declares that it is not too much to say that the fine chemical industry has been very greatly developed and extended, and that this country is now capable of manufacturing on a large scale all the important medicinal chemicals which before the war had been practically a German monopoly. One important raw material—coal tar—was produced in enormous quantities in the United Kingdom; but before the war little use was made of it by British drug manufacturers. Large quantities were exported, and used in Germany for the manufacture of certain highly important synthetic medicines. Among the coal tar and allied products referred to were the local anæsthetics, novocain and eucaine; the antipyretics, phenacetin and phenazone; the salicylate group; the intestinal antiseptics, beta-naphthol and benzo-naphthol; and the supremely important remedies, salvarsan and neo-salvarsan. Though there was need for economy in certain drugs at the beginning of the war, there was no famine; and it cannot be said that the public health at any time suffered from any lack of sufficient medicines or other medical stores.

Manchester Gas Department Roll of Honour.—A feeling of pride in the loyalty to their King and country, and in their achievements of the employees of the Manchester Corporation Gas Committee, has prompted the Superintendent (Mr. Fredk. A Price) to have prepared a Roll of Honour of those who served in the great war. This shows that, out of about 2000 employees, 927 have during the past four-and-a-half years served with the forces. Of these, unhappily 133 have made the supreme sacrifice, 136 have been wounded, 2 are reported as missing, and 19 were taken prisoners. It is proposed to perpetuate the memory of those who have fallen by the erection in the general office of the department of a bronze tablet, upon which their names will be inscribed. The roll also contains the names of those who have gained military honours. Acknowledgment is made of the splendid example the Corporation set at the outbreak of war to other employers by making allowances to dependants of the men who joined the Colours, as well as of the action of the officials who voluntarily and regularly contributed to the war benevolent fund from its inauguration to the termination of hostilities.



Gas and the Housing Scheme

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THE RICHMOND GAS STOVE & METER CO., Ltd.,
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STOCK MARKET REPORT.

BUSINESS on the Stock Exchange was on a very reduced scale, in the responsibility for which more than one factor shared. The Victory Loan excitement was no longer to the fore with its voracious demands upon all the money that could be gathered into its net; but it was said that the numerous new issues now on offer were formidable competitors in several markets. Then the popular preparations for Peace Dav demonstrations were a distracting element, and tended to shorten the hours of business. The tendency throughout was very dull—a matter, of course, proceeding from the deadly blow dealt to industry by the coal-price tragedy, coupled with the threatening aspect of strikes in several labour centres.

The gilt-edged market was weaker. In Home Government issues, the 5 p.ct. Loan did fairly, touching 94 5/16 on Friday; but pretty well all the rest were lower. Consols fell to 52, and Indians weakened. Home rails were quiet and at lower figures. Some Canadians profited by the dollar exchange; but Argentines were in trouble.

In the Miscellaneous Market, havoc was wrought by the coal crisis upon all large consumers of that commodity; Iron and Steel concerns and Shipping being prominent sufferers. Rubber took turns both ways, but was never strong. Oils tended easier on realizations. Tobacco and Textiles were the firmest.

Business in the Gas Market fell back into quietude after its little spurt of the previous week, and the general tendency was towards a shrinkage in the face of the 6s. rise in coal. The Metropolitan Companies were almost unchanged in point of quotation; South Metropolitan alone showing a fall of 1. Among Suburban and Provincial Companies, Brentford "A" and "B" had a larger fall, and British was ½ lower. In the Continentals, Imperial was easier, ranging from 133 to 135, and the quotation was put down 2. Primitivas were moderately dealt in at figures equal to those of the week before.

Bargains done for cash during the week were as follows: On Monday, Bournemouth debenture 65, Cape Town 6¼, Commercial debenture 50, Continental Union 44⅞, Gas Light ordinary 55⅛, 56, ditto maximum 51, ditto preference 69⅛, ditto debenture 54½, Imperial Continental 134, 135, Monte Video 13⅜, Primitiva 37s. 6d., 38s. 9d., 40s., ditto preference, 70s. 7½d., 71s. 3d., 72s. 6d., 73s. 9d., South Metropolitan 55, 56⅛. On Tuesday, Bournemouth "B" 10⅜, 10⅞, European 15⅛. Imperial Continental 133, 134⅛, 134⅜. 135. ditto debenture 79½. Monte Video 13, Primitiva preference 70s., 71s. 6d., South Metropolitan 55, 55⅛, 56, Brighton and Hove 6 p.ct. preference 105, Liverpool 63⅞, Romford 7 p.ct. "B" 5⅝. On Wednesday, Gas Light ordinary 55⅛, ditto preference 69⅛, Imperial Continental 133, 133⅜, 135. ditto debenture 80, South Metropolitan 55⅛. Ascot 4 p.ct. debentures 59½. On Thursdav. Gaslight ordinary 55⅛, 55⅞, 56, Portsea "C" 63, 63½, Primitiva preference, 72s., South Metropolitan 55⅛, 56⅛, ditto debenture 53½, Tottenham "B" 64½, Wandsworth "B" 69½. On Friday, Gas Light ordinary 56, ditto maximum 50, Imperial Continental 133, 133½, ditto debenture, 82, 82½, Primitiva 36s. 3d., 37s. 6d., ditto preference, 70s., 71s. 3d., 71s. 10½d., South Metropolitan 56, 56⅛.

In the Money Market, rates at first ruled quite easy; but in response to some demand later, they hardened somewhat. Discount also was firmer. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	62–67	..
1,551,868	"	April 8	2½	2⅞	Alliance & Dublin Ord.	59–64	56–60	..
274,000	"	July 11	4	4%	Do. 4 p.c. Deb.	76–79	60–62*	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	57–62	52–6½	..
50,000	10	Feb. 26	16	12%		29–30	19¼–20½	..
388,110	10	"	7	7%	Bourne- mouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	15–15½	10½–11½	10⅜–10
115,000	10	"	6	6/-		13¾–14	9⅜–10	..
159,740	—	June 27	—	4%		..	66–67	65
922,045	Stk.	July 11	14	37/-	Brentford A Consolid.	281–286	65–70*	..
734,920	"	"	11	31/8	Do. B New	204–209	60–65*	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109–111	76–78*	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91–98	64–66	..
214,775	"	Feb. 26	11	7⅛%	Brighton & Hove Orig.	208–218	137–142	..
244,200	"	"	8	6½%	Do. A Ord. Stk.	154–159	94–99	..
933,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Mar. 26	12½	10%	British	44–45	30–31	..
120,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88–90	63–65	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85–87	50–53	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½–2½	6½–6¾	6½
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4–6	7–7½	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70–75	61–66	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	..	..
1,518,280	"	Feb. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106–108	60–63	..
560,000	"	"	5½	26/8	Do. 3½ p.c. do.	103–105	58–61	..
476,000	"	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½–71½	50–52	50
800,000	"	"	4	—	Continental Union Ltd.	76–79	43–48	44⅞
200,000	"	"	7	—	Do. 7 p.c. Pref.	115–118	65–70	..
51,600	Stk.	Aug. 29	14½	12½%	Croydon A 10 p.c.	..	155–165	..
278,400	"	"	11½	9½%	Croydon B and C 7 p.c.	..	130–135	..
499,370	Stk.	—	6	5⅛%	Derby Con. Stk.	128–135	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102–104	..	..
1,009,180	10	July 29	10	5/0	European, Ltd.	17½–18	15–16	15½
16,298,975	Stk.	Feb. 10	4/17/4	80/-		98–102	55–57	55½–56
2,600,000	"	"	5½	26/8	Gas { 4 p.c. Ord. 3½ p.c. max.	76–79	51–53	50–51
4,062,235	"	"	4	4%	Light { 4 p.c. Con. Pref.	96–99	69–71	69⅛–69⅝
4,674,850	"	June 11	8	8%	and { 3 p.c. Con. Deb.	72½–74½	53–55	54½
180,000	"	"	10	10%	Coke { 10 p.c. Bonds	..	..	..
82,500	"	Mar. 12	5	4½%	Hastings & St. L. 5 p.c.	..	59–64	..
258,740	"	—	3½	2⅞%	Do. 3½ p.c	37–39	44–49	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½–16½	7–8	..
86,600	Stk.	Sept. 12	9	8½%	Hornsey 7 p.c..	..	115–120	..
181,000	"	Mar. 12	7½	6¾%	Ilford A and C.	151–154	90–95	..
65,780	"	"	6¾	4½%	Do. B	115–118	69–74	..
65,500	"	June 27	4	4%	Do. 4 p.c. Deb.	92–94	61–64	..
4,940,000	"	May 14	9	4½%	Imperial Continental	152–160	133–138	133–135
1,285,000	"	Feb. 12	8½	8½%	Do. 8½ p.c. Deb. Red.	84–86	79–81	79½–82½
225,243	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119–121	90–95	..
2,498,995	"	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A B	211–218 148–148	..	63⅞
806,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	"	Feb. 17	7/5/6	32%	Maidstone 5 p.c.	..	58–63	..
75,000	5	June 11	5	5%	Malta & Mediterranean	4¼–4¾	3½–3⅞	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99–101	90–97	..
541,920	20	May 19	4	5%	Monte Video, Ltd.	11½–12	13–14	13–13⅜
1,575,892	Stk.	July 29	4½	3½%	Newcastle&Gatsh'dCon.	98½–99½	65–67	..
599,795	"	June 27	3½	3½%	Do. 3½ p.c. Deb.	85–88	56–58	..
15,000	10	Mar. 13	—	11%	North Middlesex 10 p.c.	..	13½–14	..
56,940	10	"	7/14/0	7/0	" " 7 p.c.	14–15	9½–9⅞	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117–122	103–106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½–8½	4⅜–5½	..
60,000	50	Feb. 26	18	7½%	Portsea, Island B	128–131	76–81	..
100,000	50	"	12	6¾%	Do. C	118–121	68–68	68–68½
949,980	5	April 29	8	—	Primitiva Ord.	5½–6	1⅜–2½	36/3–40/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4¾–5	3½–3⅝	70/–78/9
521,600	100	June 9	4	4%	Do. 4 p.c. Deb.	97–98	71–73	..
600,000	Stk.	July 31	4	4%	Do. " " 1911	..	49–52	..
846,198	"	June 27	4	4%	River Plate 4 p.c. Deb.	85–87	49–52	..
150,000	10	May 14	6	6%	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½–11	7½–8	..
125,000	50	July 2	5	5%		47–49	40–42	..
135,000	Stk.	Mar. 12	10	5%	Sheffield A	228–234	82–86	..
209,984	"	"	10	5%	Do. B	229–234	82–86	..
528,500	"	"	10	4¾%	Do. C	220–222	71–74	..
133,301	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	June 27	9	10%	South African.	10½–11½	12½–13½	..
6,609,895	Stk.	Feb. 10	5/4/0	80/-	South Met. 4 p.c. Ord.	111–113	55–57	55–56½
350,000	"	July 1	—	5%	Do. Pref.	..	94–96*	..
1,895,448	"	" 1	8	8%	Do. 3 p.c. Deb.	73½–74½	52–54*	53½
224,820	"	Feb. 26	8½	5⅛%	South Shields Con. Stk.	154–159	99–101	..
952,795	"	"	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114–116	76–79	..
197,558	Stk.	June 27	5	5%	Do. 5 p.c. Deb. Stk.	116–118	88–91	..
647,740	"	May 14	7½	8%	Southampton Ord.	99–102	67–69	..
121,575	"	June 27	4	4%	Do. 4 p.c. Deb. Stk.	..	63–65	..
190,000	"	Feb. 12		4½%	Tottenham { A 5 p.c.	135–138	90–95	..
799,375	"	"	6	3⅝%	District { B 3½ p.c.	115–117	83–86	64
181,355	"	June 26	4	4%	{ 4 p.c. Deb.	87–89	64–66	..
182,380	"	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
142,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	45–50	..
286,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½–109	83–85	..
80,000	"	Feb. 26	8⅜	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151–156	88–93	..
255,686	"	"	6¾	40/-	Do. B 3½ p.c.	129–134	68–73	69½
108,075	"	"	—	38/6	Do. C	..	68–73	..
140,865	"	"	—	34/6	New Ordinary	..	68–73	..
359,000	"	"	6¾	38/9	Wimbledon 5 p.c.	117–122	63–73	..
98,000	"	"	6¾	40/-	Epsom 5 p.c.	121–126	70–75	..
88,416	"	June 27	8	8%	3 p.c. Deb. Stk.	66–69	49–51	..

* Ex Div.

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